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VENEREAL DISEASES

A MANUAL FOR STUDENTS AND PRACTITIONERS

BY

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PREFACE.

In the preparation of the fourth edition of this manual, the author has endeavored to emphasize, as before, the practical, clinical aspects of the subjects under discussion. Only those methods of diagnosis and treatment have been included which the personal experience of the writer has proved to be useful and efficient.

The number of illustrations has been more than doubled and the vast majority of them are original. The text has been completely revised and the greater part rewritten.

The author takes pleasure in acknowledging his indebtedness to Dr. Rolfe Kingsley, Assistant Chief of Clinic at the Vanderbilt Clinic, for his assistance in the revision of the text.

J. R. Hayden.

121 West 55th Street,
New York, 1916.

CONTENTS.

CHAPTER I.

Gonorrhea 17

CHAPTER II.

Acute Gonorrhea 24

CHAPTER III.

Treatment of Acute Anterior and Posterior Gonorrhea 32

CHAPTER IV.

Complications of Acute Anterior Gonorrhea and Their Treatment 51

CHAPTER V.

Complications of Acute Posterior Gonorrhea and Their Treatment 63

CHAPTER VI.

Chronic Anterior and Posterior Gonorrhea 84

CHAPTER VII.

Treatment of Chronic Anterior and Posterior Gonorrhea 89

CHAPTER VIII.

Gonorrheal Ophthalmia 104

CHAPTER IX.

Gonorrheal Arthritis 107

CHAPTER X.

Stricture of the Urethra 115

CHAPTER XI.

Symptoms of Stricture 127

CHAPTER XII.

Complications of Stricture 130

CHAPTER XIII.

Diagnosis of Stricture 138

CHAPTER XIV.

Treatment of Stricture 151

CHAPTER XV.

Retention of Urine 176

CHAPTER XVI.

Urinary Fever 185

CHAPTER XVII.

Urethral Instruments: Their Care and Use 188

CHAPTER XVIII.

Common Affections of the Glans and Prepuce 198

CHAPTER XIX.

The Chancroid 208

CHAPTER XX.

Syphilis 221

CHAPTER XXI.

The Initial Lesion 228

CHAPTER XXII.

The Secondary Period 236

CHAPTER XXIII.

Syphilis of the Appendages of the Skin 263

CHAPTER XXIV.

Syphilis of the Mucous Membranes 267

CHAPTER XXV.

Syphilis of the Digestive Organs 269

CHAPTER XXVI.

Syphilis of the Respiratory Organs 278

CHAPTER XXVII.

Syphilis of the Organs of Circulation 282

CHAPTER XXVIII.

Syphilis of the Genito-urinary Organs 284

CHAPTER XXIX.

Syphilis of the Nervous System 288

CHAPTER XXX.

Syphilis of the Muscles 296

CHAPTER XXXI.

Syphilis of the Bones, Cartilages, and Joints 301

CHAPTER XXXII.

Syphilis of the Eye 306

CHAPTER XXXIII.

Syphilis of the Ear 314

CHAPTER XXXIV.

Constitutional Treatment of Syphilis 316

CHAPTER XXXV.

Hereditary Syphilis 336

CHAPTER XXXVI.

Lesions of Hereditary Syphilis 339

VENEREAL DISEASES.

CHAPTER I.

GONORRHEA.

INTRODUCTION.

Gonorrhea, or specific urethritis, is a virulent, infectious, and suppurative process, attacking most frequently the mucous membrane of the urethra and the glandular structures in anatomical relation with it. Gonorrheal ophthalmia, or proctitis, may occur during the course of a urethral gonorrhea, the organism having been deposited upon one of these structures either as the result of accident or of unnatural practises in depraved individuals. Ophthalmia, or proctitis, may also be observed independently of urethral infection in the bearer.

Cases of gonorrheal stomatitis and rhinitis have been reported, but as yet lack positive and sufficient proof, and therefore cannot be accepted without much reserve.

Specific urethritis is the most common of all the venereal diseases, is usually sexual in origin, and occurs with the greatest frequency between the twentieth and thirtieth years, although cases of gonorrheal infection are not infrequently encountered in infants and young children, and the

disease is also met with in middle-aged, and even elderly individuals.

An attack of gonorrhea confers no immunity upon its bearer, reinfection being followed by a reappearance of the disease with all of its symptoms often quite as severe as those of the initial or previous attack.

As a rule, the intervening *mild* attacks are, in reality, nothing more than a lighting up of an uncured and localized gonorrheal process, either in the urethra itself or in some of the glandular structures in relation with it; the exciting causes being alcoholic, dietary, and sexual excesses, non-specific secretions from the female genitalia, concentrated urine, rough instrumentation, irritating injections, violent physical exertion, or in fact, anything that in any way causes irritation and congestion of the urethra or its contiguous structures.

Infection with the gonococcus may be either direct or mediate.

Direct infection consists in the transference of gonorrheal pus from the genitalia of one person to those of another during coition. This is the usual and most common mode of infection, although it may also result from unnatural sexual practises.

Mediate infection may occur when instruments, syringes, towels, dressings, the fingers, or in fact, any articles that have been contaminated with gonorrheal pus are brought into contact with the meatus or urethral mucous membrane. While this method of infection is certainly rare, we should not be so dogmatic and skeptical as to deny its possibility. The author has seen a number of cases which permitted no doubts as to the disease having been acquired in this innocent manner.

Etiology.—The exciting cause of the disease is a specific diplococcus discovered by Neisser and named by him the gonococcus.

This organism is the exciting cause of every case of gonorrhea (specific urethritis). Cases of urethritis are not uncommonly encountered, however, in which the gonococcus cannot be found. These infections are spoken of as non-specific or simple catarrhal, the suppuration being due to other microörganisms.

The physician should therefore exercise the greatest care and common-sense in every case before giving a final and positive opinion as to its nature, as on his word may rest the honor and loyalty of wife, husband, or consort.

The gonococci are D-shaped organisms, measuring from 0.8 to 1.6 mmm. in length and from 0.6 to 0.8 mmm. in breadth. As seen under the microscope they occur in pairs, with the flat or inner borders in apposition, like the two halves of a coffee bean (Fig. 1). They multiply very rapidly under favorable circumstances, each pair splitting into four by means of cleavage at right angles to the median fissure.

In gonorrheal pus they occur within and upon the phagocytes and epithelial cells and scattered about between them, grouped in twos, fours, eights, etc., and never arranged in definite chains.

They are readily found and recognized in the urethral pus of acute cases; but with increasing difficulty as the gonorrheal process becomes subacute and chronic, when it is then most difficult, and sometimes impossible, to differentiate them from other diplococci, except by culture experiments, which should always be employed in doubtful cases before giving a final and positive opinion as to the nature of a given diplococcus.

In making a diagnosis by microscopic examination only those organisms which are *intracellular* should be considered.

The method of obtaining and staining the smear should be as follows:

The entire glans penis and preputial cavity should be thoroughly cleansed, and the pus at the meatus squeezed

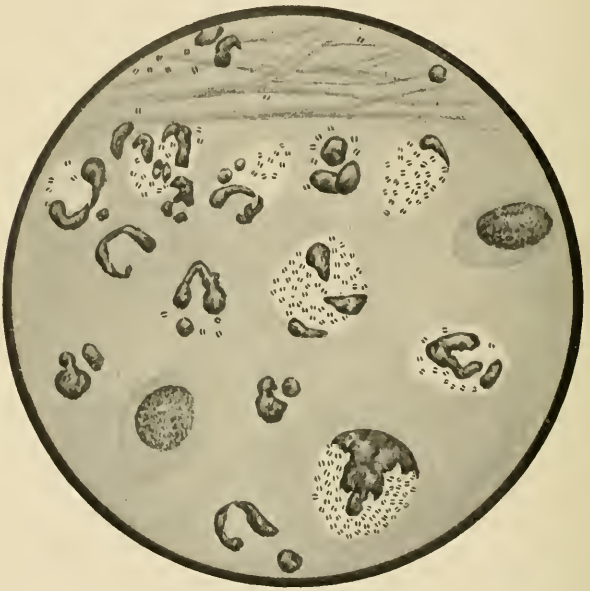


FIG. 1.—Gonococci in the acute or suppurative stage. (Original.)

out and wiped off with sterile gauze. A sterilized platinum loop is then passed into the urethra to obtain the secretion for examination, or a drop of pus expressed from the meatus; this is spread in a very thin film on a clean glass slide or cover-glass, allowed to dry in the air, and is then passed through the flame of an alcohol lamp or Bunsen burner two

or three times, being careful to have the pus side uppermost. A few drops of a 1 per cent. watery solution of methylene blue are then applied, left on for a minute, and then washed off with distilled water and the preparation dried. The specimen can now be examined by means of a one-twelfth inch oil-immersion lens, when all of the organisms in the field will be seen to have taken on a deep blue color. Should intracellular organisms of the type described above be found, a second smear should be obtained and stained by Gram's method, as follows:

The specimen having been fixed as before, by flaming, is stained for two minutes with either carbol- or anilin-water gentian violet; this is then drained off and the smear flooded with Gram's iodin solution for one minute. The specimen is then decolorized in alcohol, washed with distilled water, and counter-stained with 1 per cent. watery Bismarck-brown solution.

If the intracellular diplococci in this smear have given up the gentian violet and are stained brown we can then be reasonably certain that they are gonococci, but the fact should never be forgotten that when the organisms occur only very scantily, or when any other cause for doubt exists, a final diagnosis should never be made without the assistance of cultures. Other diplococci have been found in the normal urethra which bear so striking a resemblance to gonococci as to general appearance and color reactions that in some instances they can only be differentiated by culture experiments; and as these latter are beyond the reach of many physicians, we cannot be too careful and conservative in giving an absolute and positive opinion as to the specific nature of a given diplococcus.

For other methods of staining, and for culture and in-

noculation experiments with the gonococcus, the reader is referred to any of the standard works on bacteriology.

Pathology.—When infection of the urethra by the gonococcus occurs the invasion of the tissues proceeds as follows: The gonococci, having been deposited on the superficial layer of the lips of the meatus or of the fossa navicularis, increase rapidly in numbers and give rise to a scanty, serous discharge, which appears at the meatus and which consists of serum and epithelial cells, upon and between which gonococci are seen in varying numbers. This constitutes the *first, prodromal*, or *serous* stage of the disease.

The organisms spread more or less rapidly along the urethra by continuity of tissue, and at the end of twelve to twenty-four hours penetrate the cement substance between the epithelial cells and pass into the subepithelial connective-tissue layer and the bloodvessels.

This stage of invasion is marked by the onset of a profuse, purulent discharge and the destruction and casting-off of the normal cylindrical epithelium of the urethra, thus giving free access to further gonococcus invasion, and marking the onset of the *second, acute*, or *purulent* stage. The purulent discharge is made up of pus and epithelial cells, serum, and sometimes a few red blood cells; the gonococci being found principally in the pus cells, although some free groups may be seen.

After a period varying between ten days to two weeks the character of the discharge begins to change. It is less profuse, and from being thick and creamy becomes mucopurulent and sticky. At the same time the other signs of acute inflammation begin to abate, and the disease enters upon the *third, subacute*, or *declining* stage. The congestion and edema of the mucous membrane diminish from

day to day, the discharge becoming correspondingly thinner and scantier until the *fourth* or *chronic* stage is reached, which is marked by a slight mucoid or serous discharge, often visible only in the morning, with a mucous membrane which is normal except for isolated spots of congestion, erosion or superficial ulceration, these marking the localities where the gonorrheal process has become localized. Such areas are most commonly found in the bulbous portion of the canal, which, being of larger caliber, surrounded by erectile tissue, and from its dependent position, poorly drained, is particularly prone to harbor a chronic inflammatory process.

CHAPTER II.

ACUTE GONORRHEA.

Acute gonorrhea is spoken of as being either anterior or posterior, according to the portion of the urethra involved by the inflammatory process.

If the disease be situated in the anterior urethra—that is, between the meatus urinarius externus and the anterior layer of the triangular ligament (pendulous and bulbous urethræ)—it is called anterior gonorrhea; but if in the posterior urethra, which includes that portion of the canal situated between the anterior layer of the triangular ligament and the bladder (membranous and prostatic urethræ), it is called posterior gonorrhea.

When the entire length of the urethra is involved, as is usually the case, we then speak of it as an anteroposterior gonorrhea; and if the disease has extended into the bladder, involving to a limited extent the mucous membrane surrounding the vesical orifice and trigone, it is known as a urethrocystitis.

ACUTE ANTERIOR GONORRHEA.

After a period of incubation varying, in the majority of cases, from two to seven days, the symptoms of acute anterior gonorrhea make themselves manifest.

For clinical purposes the course of the disease is best divided into four stages, as follows: the prodromal stage, the acute stage, the stage of decline, and the chronic stage.

In the prodromal, or first stage, which may last from a few hours to a day or two, the symptoms may be quite severe, or so mild as often to escape notice. They consist of pricking or tickling sensations in the meatus, which becomes reddened, slightly swollen and glued together, or filled with a scanty, serous secretion. Sometimes decided pain is felt in the glans, but in other cases pain is only experienced during and after urination.

At the end of a day or two all of the above symptoms become more marked. The meatus is pouting in appearance and surrounded by a zone of redness, the secretion is increased in amount and assumes a decidedly purulent character, the pain is sharper and during urination gives rise to a decided burning sensation in the urethra, which is spoken of as ardor urinæ; this may be continuous, or only felt during and after the act.

With the onset of the second or acute stage, which usually begins at the end of twenty-four to forty-eight hours, the discharge becomes profuse, greenish-yellow in color, creamy in consistence, and sometimes tinged with blood, the lips of the meatus and often the entire glans penis are bright red in color, hot and swollen; the edema may extend from the lower angle of the meatus into the frenum and thence into the prepuce, in this way being liable to produce either a phimosis or paraphimosis, according to the conformation of the parts.

In severe cases the lymphatics on the dorsum of the penis become swollen and painful, and as they communicate with the inguinal lymph ganglia these latter may become enlarged and tender; but they very rarely suppurate. As the gonorrheal process extends up the urethra it sometimes causes an inflammation of one or more of the periurethral

follicles, which can be felt beneath the skin as small shot-like bodies. In severe cases the corpus spongiosum becomes hard and painful, and if this condition extends to the bulbous portion, patients experience great pain in sitting down and crossing the legs, as pressure is thereby brought directly on this swollen and inflamed mass of erectile tissue. Every act of urination is now accompanied by intense suffering as the acid urine forces its way through the urethra, whose caliber has been greatly lessened by the edema of its mucous membrane, from whose congested surface blood is sometimes forced by the pressure of the accelerator urinæ muscle on the erectile tissue of the bulb at the close of urination. The stream assumes various shapes and sizes, and in severe cases comes only in drops, or there may be complete retention of urine, due to swelling of the mucous membrane and compressor spasm.

Painful erections, and in some cases, chordee now come on, especially at night, which rob the patient of his rest, and in this way cause debility and general malaise from loss of sleep, and nervousness. True chordee is due to infiltration of the meshes of the corpus spongiosum with inflammatory material, which prevents its full extension when the corpora cavernosa become erect, thus causing the penis to curve downward. It is a rare complication of acute gonorrhea, as compared to painful erections, which occur in almost every case.

The third or declining stage usually begins at about the end of the second or beginning of the third week and is marked by a general improvement in the patient's condition. Urination becomes less painful, the erections at night disappear, as do also the swelling and soreness along the corpus spongiosum. The meatus and glans penis begin to assume their normal appearance, and the discharge becomes muco-

purulent, thinner and stickier in character, until it is so slight in amount as to cause only a gluing of the lips of the meatus in the morning, from which, when separated, a few drops of secretion may be pressed. The further uncomplicated course of the disease is indistinguishable from that of chronic gonorrhea, and will be described under that heading in Chapter VI.

Relapses may occur at any time, as the patient, thinking himself about cured, is apt to indulge in overexercise, alcoholics, indiscretions in diet, or sexual intercourse, which indulgence is rapidly followed by the return of many or all of the acute inflammatory symptoms described above.

ACUTE POSTERIOR GONORRHEA.

When the gonorrheal process passes beyond the anterior layer of the triangular ligament and involves the membranous and prostatic portions of the canal (posterior urethra), we speak of it as an acute posterior gonorrhea. In from 90 to 100 per cent. of all cases of acute gonorrhea the disease passes, quite rapidly, up the urethra to the bulb and thence into the posterior portion. Posterior urethritis, therefore, instead of being a complication, is in reality part of the usual course of the disease in the vast majority of cases.

This invasion of the deeper parts of the canal may take place so gradually and with such mild symptoms as to escape detection, unless we are on the lookout for it; but in the majority of cases it is indicated by a sudden and very marked decrease in the amount of discharge at the meatus, accompanied by an increased frequency in urination, with inability to hold the urine when the desire comes on (urgency), followed by vesical tenesmus, and in severe cases by blood

in the urine at the end of micturition (terminal hematuria), which comes from the congested vessels of the prostatic urethra, which are ruptured by the spasmodic contractions of the prostatic muscular fibres, at the close of urination. In such cases small, worm-like clots of blood, formed in the urethra during the intervals of voiding, are sometimes passed with the first gush of urine as it washes out the contents of the canal.

In some cases the patient has to urinate every few minutes, each act being followed by a few drops of blood and intense pain in the glans penis, perineum, and rectum; in others there is temporary incontinence of urine, due to the extreme irritability of the prostatic mucous membrane, so that when the patient goes to sleep at night, painful pollutions occur that are sometimes blood-stained. Retention of urine may occur at any time from spasm of the compressor urethræ muscle brought on by the intense local irritation; we should therefore always be prepared to deal promptly with this distressing complication.

Vesical tenesmus, if severe, is often accompanied by a temporary albuminuria, which disappears as the tenesmus subsides.

In the mild cases our only way of detecting an involvement of the posterior urethra is by the frequent employment of *Thompson's two-glass test,* which is performed in the following manner:

The patient passes the greater part of his urine into one glass cylinder and the remainder into another. If the disease is confined to the anterior urethra, the urine in the first glass will be cloudy, from the pus washed out of the anterior urethra, while that in the second cylinder will be clear, as it consists of normal urine from the bladder passed through a now clean urethra. Should the posterior urethra

be involved, however, the pus from it, escaping backward into the bladder, renders all the urine in that viscus cloudy; the urine in both cylinders therefore will be purulent and opaque, the first a trifle more so than the second, as it consists of turbid urine from the bladder plus the urethral secretion which it washes out.

For the proper performance of this test it is essential that the patient have at least 8 to 10 ounces of urine in the bladder, a well-marked urethral discharge, and that he should pass the larger part of his bladder contents into the first glass. Under these conditions the test is of great diagnostic value in acute cases, but it is quite useless in subacute or chronic ones.

As the opacity in a given urine is not always due to the presence of pus (pyuria), the following table of Ultzmann renders this subject clear in a very concise manner. By gradually heating the upper half of the urine (in a test-tube) to boiling, the opacity:

Vanishes.	Increases.			Remains unchanged even after addition of acetic acid.
If due to acid urates.	If due to *earthy phosphates*, *carbonates*, or *pus corpuscles*. Add one or two drops of acetic acid.			The dimming is caused by *catarrhal secretion*, or by *bacteria*.
	Dimness vanishes with evolution of gas: *Carbonates.* (Carbonaturia.)	Dimness vanishes without evolution of gas: *Phosphates.* (Phosphaturia.)	Dimness remains unchanged: *Pus.* (Pyuria.)	

The duration of the attack depends largely upon the treatment employed and the habits of the patient.

Acute posterior gonorrhea is apt to be very severe and rebellious to treatment in persons who have a previously congested condition of the deep urethra, prostate, or seminal vesicles, either as the result of sexual abnormalities or excesses, or a previous gonorrheal infection of these structures.

Diagnosis.—The diagnosis of acute gonorrhea is, as a rule, readily made from the history of the case, the purulent urethral discharge, which should always be examined microscopically for the gonococcus, the redness and swelling of the meatus and glans, painful urination, and the period of incubation.

There are cases, however, in which it must be differentiated from balanitis, balanoposthitis, chancre of the meatus or urethra, and chancroids of the meatus.

In balanitis or balanoposthitis, if the prepuce can be retracted far enough to expose the meatus, the parts should be carefully wiped off and examined, when a correct diagnosis can easily be made, as the pus will be seen to exude, either from the meatus if it be gonorrhea, or from between the prepuce and glans if it be balanitis or balanoposthitis.

Chancre of the meatus or within the urethra gives rise to a slight watery, mucous, or mucopurulent discharge, with induration of the lesion and of the inguinal lymphatic glands at the end of about ten days. Endoscopic examination will reveal the lesion if it be situated in the canal. As the induration about the lesion develops, there is increasing difficulty in urination. Microscopic, dark-field examination of the discharge will exclude the gonococcus and may reveal the presence of the Spirocheta pallida.

Chancroids of the meatus cause a purulent discharge

which is auto-inoculable. They may give rise to some inflammatory thickening of the surrounding tissues, but never to true induration. The inguinal glands are more or less painful and enlarged, and may even go on to suppuration and abscess formation.

Prognosis.—The prognosis of gonorrhea is, as a rule, good, provided the patient is otherwise healthy and is willing to carry out minutely all the details of an intelligent and conservative treatment until he is pronounced cured by his physician.

There are cases, however, in which serious and sometimes even fatal complications occur, such as gonorrheal synovitis, tenosynovitis, bursitis, myositis, arthritis, peri- and endocarditis, peritonitis, meningitis, and pyemia. We must therefore explain to our patients that gonorrhea is at best a grave, persistent, and far-reaching infection, and that treatment must not be relaxed until the urethra and the structures in anatomical relation with it have been returned to their normal condition.

If during the course of a case of acute posterior gonorrhea a digital examination of the prostate gland is made by rectum, it will frequently be found swollen, hot, throbbing, and exquisitely tender (acute prostatitis). Occasionally one or even both of the seminal vesicles may be involved, but this complication is rare in comparison with prostatitis, as has been demonstrated by a large number of examinations made by the author during the acute stage of the disease.

CHAPTER III.

TREATMENT OF ACUTE ANTERIOR AND POSTERIOR GONORRHEA.

The treatment of acute anterior gonorrhea depends entirely upon the stage of the disease at which the patient presents himself to the physician.

If in the prepurulent or serous stage, some form of abortive treatment may be employed. If, however, the disease has reached the purulent stage, then a milder and more symptomatic plan should be instituted.

Abortive Treatment.—The abortive treatment of acute gonorrhea or specific urethritis should only be employed during the first day or so of the disease, while the discharge is still serous in character, and shows under the microscope only epithelial cells and gonococci, but no pus cells, as in this stage the gonococci are situated upon the epithelium of the urethra and are therefore in a position to be destroyed by local applications.

Unfortunately the vast majority of patients do not present themselves until the discharge has become purulent, when it is too late to try any form of abortive treatment, as by that time the gonococci have penetrated the epithelial layer of the urethral mucous membrane and are therefore to a great extent beyond our reach. It can readily be seen, therefore, that but few patients will seek medical advice early enough to justify our attempting to abort the disease.

However, if after a careful microscopic study of the discharge, the abortive treatment has been decided upon, the patient should always be informed that it is more or less painful, apt to fail, and may lead to such complications as periurethral abscess, posterior urethritis, epididymitis, prostatitis, seminal vesiculitis, abscess of the prostate, and cystitis.

The steps in the procedure are as follows: The patient having voided his urine, thus washing out any accumulated secretion, lies down. The meatus and glans penis are washed with sterile water and a small (10 to 12 French)

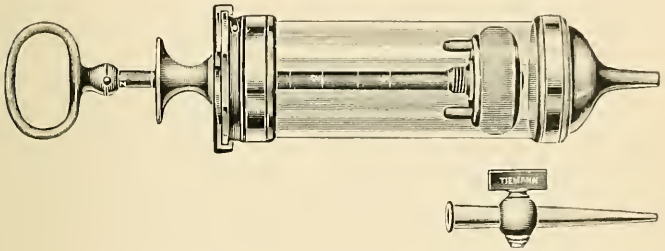


FIG. 2.—Author's four-ounce bladder syringe and coupler.

soft-rubber catheter is passed into the urethra for two or three inches, the patient compressing the canal firmly behind this point to prevent the backward passage of fluids. Through the catheter by means of a four-ounce hand syringe (Fig. 2), the canal is irrigated with warm, sterile water, thrown in slowly and gently, the solution running from behind forward, alongside the catheter and escaping at the meatus. After this thorough irrigation of the canal the catheter is very slowly withdrawn while we inject through it, with an instillation syringe (Fig. 3), a drachm or two of a solution of nitrate of silver, 10 to 15 grains to the ounce.

The fossa navicularis and adjacent portions of the urethra, which are the seat of the disease at this period, are thus thoroughly medicated with the silver solution, and the gonococci, situated upon the surface of the mucous membrane, are destroyed.

If so desired, we may substitute for the nitrate of silver solution a 10 or even 20 per cent. solution of protargol, which is almost as efficacious and not so irritating. Argyrol and the various other so-called "organic" silver preparations have not proved as efficient in the author's experience.

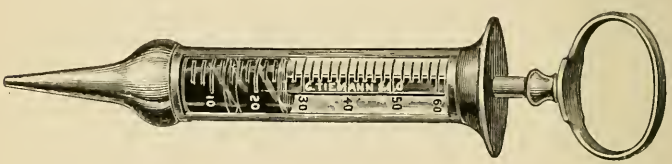


FIG. 3.—Author's instillation syringe.

The patient is now instructed to rest as much as possible, put upon a light, non-irritating diet, both as to solids and liquids, and the urine rendered bland by still waters and alkaline mixtures. The bowels are moved freely by means of cathartic pills, and the penis and preputial cavity kept clean by frequent immersions in hot lead-water or hot bichloride solution, 1 to 5000. The silver application is followed in a short time by painful urination and a purulent discharge, which, if the treatment be successful, subsides in a few days, leaving the patient with a slight mucopurulent exudate, which is readily controlled by astringent hand injections. If, on the other hand, the treatment has failed to abort the disease, then the discharge continues, showing under the microscope gonococci and pus cells in

increasing numbers, the case now presenting the clinical picture of the acute or suppurative stage, in which event all further attempts at abortive treatment should be abandoned.

It should not be forgotten that this procedure is exceedingly irritating, and should never be resorted to if there is the slightest indication of the discharge having become purulent. Cases have been reported in which the use of this method, after the onset of the purulent stage, has resulted in more or less sloughing of the mucous membrane of the anterior urethra.

The Janet method of aborting and treating acute gonorrhea has been much in vogue, but its popularity at the present writing seems to be decidedly on the wane. Its advocates claim that it will abort the disease in its incipient stage, and cut short the period of acute suppuration if employed at a later date. Ten or twelve treatments are said to be sufficient to accomplish a cure. Warm solutions of permanganate of potash are used for the irrigations, and vary in strength from 1 to 4000 to 1 to 1000, and even up to 1 to 500 during the declining stage.

Janet uses an irrigator or fountain syringe with several feet of rubber tubing, to which is attached a conical glass nozzle; a stopcock on the tubing controls the flow of the fluid. The patient, having urinated, lies on his back or reclines in a chair, and the glass nozzle is inserted snugly into the meatus and the fluid turned on. The irrigator is raised two feet above the level of the patient if the anterior urethra alone is to be treated, but if the posterior urethra and bladder are to be medicated, it is elevated about five feet or even higher, so as to increase the pressure and force of the flow, which in a few minutes tires out and overcomes

the compressor urethræ muscle and vesical sphincter, which, relaxing, allow the solution to enter the deep urethra and bladder; when the bladder is distended, the irrigation is stopped, and the patient, standing, voids the solution by the urethra. These irrigations are given once or twice daily, one pint being used for the anterior urethra and two pints when the posterior urethra and bladder are to be medicated. Although this method does cause a rapid cessation of the purulent discharge, as is claimed by its advocates, it is liable to cause more or less dilatation of the glandular structures which open into the urethra, and also to leave the canal in a thickened, congested, and irritable condition, which gives rise to a watery or mucoid discharge, very difficult, and in some cases, almost impossible to cure.

Spasm of the compressor muscle, and even of the muscular layer of the anterior urethra, is frequently observed following this treatment; as is also an intensely congested, hard, and painful condition of the prostate gland.

I have seen a large number of patients suffering from the above conditions as a result of this treatment, all of them informing me that the method was uncleanly and painful, and a few stating that the irrigations caused quite a considerable oozing of blood from the meatus.

The above facts are not to be wondered at when one considers the force and strength of the solution rushing through and distending such an acutely inflamed and delicate canal as the urethra is at this time; also, the injurious effect of overcoming by hydraulic pressure the delicate musculature which guards the deep urethra and bladder, to say nothing of the parts beyond.

If so desired, the bladder and urethra may be irrigated with a small soft-rubber catheter and hand syringe, and

most satisfactory results obtained without causing traumatism and increased congestion of the mucous membrane, with injury to the cut-off and prostatic muscles.

In our efforts to annihilate the gonococcus, we must never forget that we have a very severe inflammatory process to deal with, attacking one of the most delicate and highly sensitive mucous membranes in the body, which, if roughly or unskilfully handled in the acute stage of this virulent process, will leave the patient's urethra and contiguous structures in a more or less permanently damaged condition.

In the vast majority of cases the physician does not see the patient until the acute stage of the disease is well established and it is too late to attempt any abortive plan of treatment; in which case the only method the author can recommend is that which is set forth below.

Treatment of the Acute Stage.—Patients must be kept as quiet as possible, rest in the recumbent position being preferable. For the first week or ten days, or even longer if the symptoms of inflammation are very marked, the diet should be light and easily digested, and the following articles should be excluded:

Ham, bacon, red meats, green vegetables, fresh fruits of all kinds, condiments and spices, vinegar, coffee, chocolate, cocoa, all alcoholic drinks, ginger ale, and effervescent waters.

Weak tea is allowable in moderation, as is smoking.

The testicles must be supported in a well-fitting suspensory bandage (Figs. 4 and 5), which does not press upward on the urethra at the penoscrotal junction or in the perineum, and thus interfere with the proper, free drainage of the canal. The glans penis and the preputial cavity must be kept scrupulously clean by the frequent use of hot water.

The penis should be so dressed as to allow free drainage of the urethral pus, which at the same time must be kept from the preputial cavity, the patient's clothing and his fingers. These requirements are fulfilled by a piece of

FIG. 4

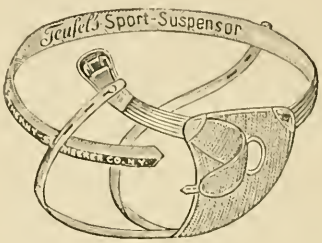
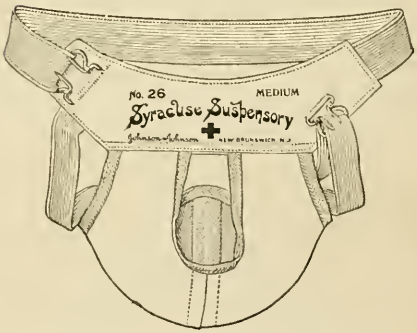


FIG. 5



FIGS. 4 and 5.—Suspensory bandages.

absorbent gauze cut about four inches square (Fig. 6), with a slit in the centre (Fig. 7) through which the glans is passed until the gauze rests in the coronal sulcus (Fig. 8) when the prepuce is drawn forward, carrying the gauze before and beneath it, thus causing it to protrude beyond the preputial

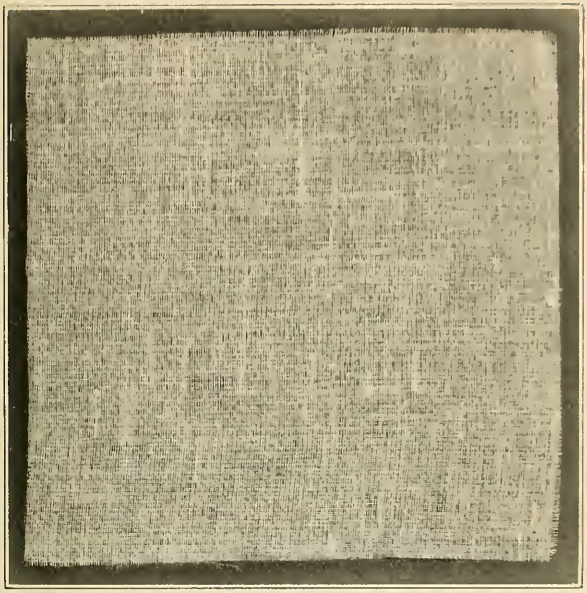


FIG. 6.—Square of absorbent gauze.

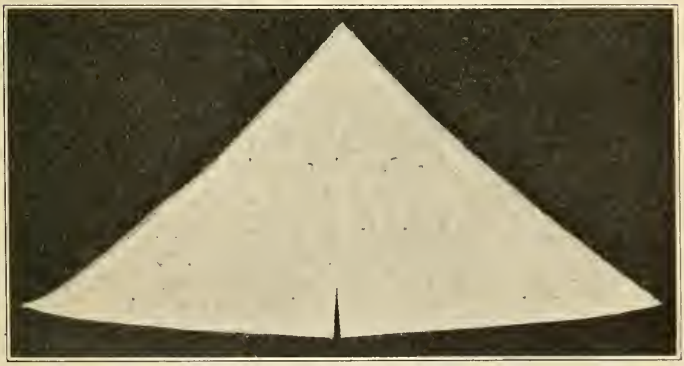


FIG. 7.—Square of absorbent gauze with slit in centre.

orifice (Fig. 9). This dressing should be changed several times daily, according to the amount of discharge. If there is much inflammation in the glans and prepuce, great relief can be obtained by keeping the gauze moistened with lead-water. If the prepuce is too short to hold the above dressing in place, the end of the penis can be placed in a bag of

Fig. 8.—Gauze in coronal sulcus.

absorbent gauze which is pinned to the suspensory bandage (Fig. 10). To allay the local pain and inflammation, the penis should be immersed several times daily in a hot lead solution, which can be easily and quickly prepared by dissolving one tablet in a glass of hot water, each tablet containing 15 grains of subacetate of lead, which is equal to

about 1 drachm of Goulard's extract. The hot sitz bath, at a temperature of 105° to 107° F., relieves to a great extent the feeling of soreness and stiffness in the groins, penis and along the bulb, and may be taken once or twice daily.

FIG. 9.—Dressing complete.

The bowels should be kept freely open, preferably by cathartic pills, as saline purgatives are apt to produce more or less urethral irritation, owing to their content of magnesium sulphate.

It is extremely important to warn patients of the danger of infecting the eyes, and impress upon them the gravity of such an accident; also the danger of contaminating water-

closets, baths, towels, etc., and in this way causing the infection of others.

To render the urine bland and non-irritating, the patient should drink freely of any still water, a glassful every hour

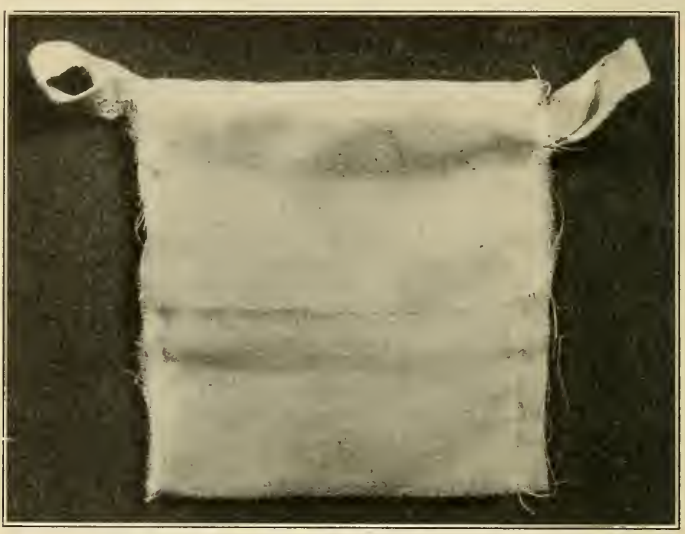


Fig. 10.—Gauze bag for acute urethritis.

during the day and whenever he wakes at night. He should also be given one of the following alkaline mixtures:

℞—Potass. bicarbonat., ℥j
Tr. hyoscyam., ℥ij–iij
Aq., ad ℥viij—M.
Sig.—℥ss in water one hour after each meal and at midnight.

℞—Potass. acetat., ℥j
Syr. aurant. cort., ℥ij
Aq., ad ℥viij—M.
Sig.—℥ss in water one hour after each meal and at midnight.

For the prevention of painful erections, the patient should be instructed to empty his bladder just before retiring, and to sleep on his side on a hard mattress, with as light covering as possible.

If awakened by an erection he can usually obtain relief by emptying the bladder and by cold applications to the penis; occasionally, however, heat will be found more beneficial.

Internally, we may prescribe monobromide of camphor, potassium bromide, lupulin, or medinal. If these drugs do not relieve, we may be compelled to resort to suppositories of opium, or opium and belladonna; but these should never be used unless absolutely necessary, as they may have to be continued for some time, are constipating, and more or less depressing in their after-effects.

Treatment of the Declining Stage.—When as a result of the above treatment the very acute inflammatory symptoms begin to subside, as is indicated by a diminution and thinning of the urethral discharge, less pain on urination, and a decrease in the redness and swelling of the meatus, it is time to begin the careful and judicious use of bland and non-irritating injections, administered by the patient himself (hand injections); or better still, warm medicated irrigations given daily or every other day by the physician. In all cases when a hand injection is ordered, the patient should be told what kind of a syringe to purchase, and how to use it.

A good urethral syringe is made of smooth, highly polished hard rubber (Fig. 11), or rubber and glass, with a bluntly conical tip (Fig. 12); it holds from two to four drachms, and the plunger should work smoothly and easily.

These syringes are sometimes made with soft-rubber

tips, but they possess no practical advantage over the all-hard-rubber or glass ones, and cannot be kept as clean.

A glass syringe with conical tip (Fig. 13) is much less expensive than rubber, and at the same time quite as good, and can therefore be used in hospital and dispensary work,

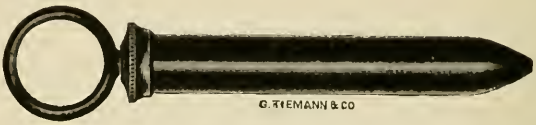


FIG. 11.—Hard-rubber urethral syringe.

FIG. 12.—Hanover urethral syringe.

FIG. 13.—Glass urethral syringe.

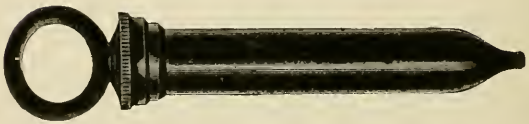


FIG. 14.—Hard-rubber syringe for small meatus.

where the item of expense is an important one. This syringe is also made with a soft-rubber conical tip. For patients with a very small meatus a hard-rubber syringe with a small, nipple-shaped point, may be ordered (Fig. 14).

Hand injections are given as follows: The patient urinates,

wipes the meatus with a bit of gauze, and standing up with the penis on the stretch and at right angles to the body, gently inserts the nozzle of the completely filled syringe into the meatus, the lips of which are lightly pressed together from side to side against the syringe; the solution is then thrown in slowly until there is a feeling of distention, when it may be allowed to escape, or if not too uncomfortable, kept in for a minute or two. While the fluid is being injected the patient should contract the compressor urethræ muscle, much as if he were trying to hold back the contents of the bladder, in order to prevent the passage backward of any of the medication into the posterior urethra.

Hand injections should be taken two or three times daily, beginning with a warm solution of sodium chloride (1 per cent.), boric acid or lead-water, and after a day or so, with the following formulæ used in the order here given:

(1) ℞—Zinc. acetat., gr. xij
Liq. plumb. subacetat., ℥j
Aq. destillat., ad ℥vj

Or

(2) ℞—Zinc. sulphat.,
Plumb. acetat., āā gr. vj–xij
Aq. destillat., ad ℥vj

Or

(3) ℞—Zinc. sulphat.,
Aluminis, āā gr. vj–xij
Aq. destillat., ad ℥vj

and, later (4), potassium permanganate solution, beginning with 1 to 8000 and increasing the strength gradually up to 1 to 3000 or even 1 to 2000.

The newer silver salts, argyrol, protargol, albargin, etc., have been highly recommended as hand injections, but have

not proved as effective, in the author's experience, as the formulæ given above.

If the hand injection causes irritation, as it sometimes does, it must be discontinued for a time, until the irritation has abated, and then resumed cautiously, using a weaker

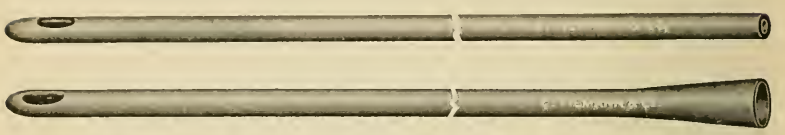


Fig. 15.—Soft-rubber catheters.

solution than that employed when the signs of irritation developed.

If, however, the patient can come to the surgeon every day during the subacute stage, great benefit will be derived from the use of warm and soothing irrigations thrown into the bulb of the urethra, instead of the hand injections above alluded to.

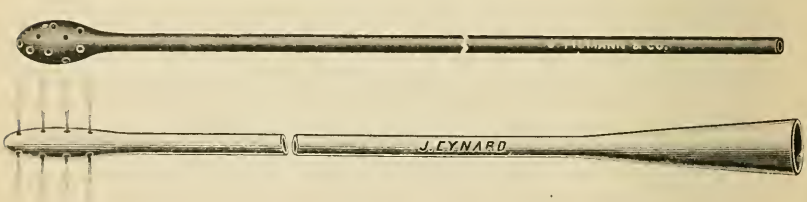


Fig. 16.—Bulbous catheters.

These irrigations are given daily, or every other day, and if properly employed will materially lessen the duration and severity of the attack. The patient, having urinated, stands or reclines, and the operator passes a small soft-rubber or bulbous silk catheter, properly lubricated (Figs. 15

and 16), into the bulb, and injects from four to eight ounces of warm medicated fluid, slowly and gently, by means of a four-ounce syringe and coupler (Fig. 2). In this manner the solution washes out and medicates the entire anterior urethra and escapes at the meatus, where it is caught in a basin (Fig. 17). We may use for this purpose warm solutions of boric acid or lead-water, and later, weak solutions of

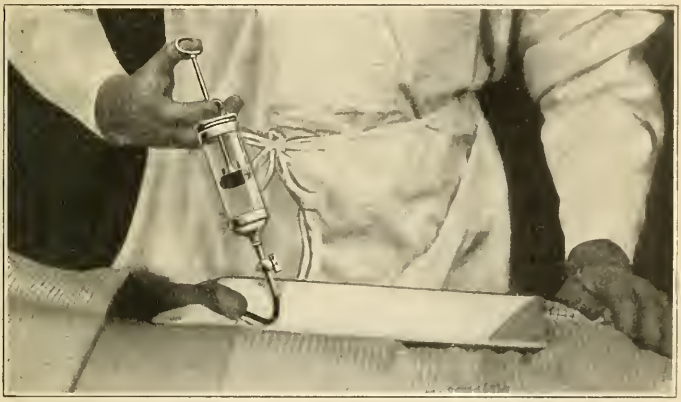


FIG. 17.—Urethral and bladder irrigation. (Original.)

zinc sulphate, alum, permanganate of potash, and finally nitrate of silver.

In the declining stage great benefit is derived from the intelligent use of the antiblennorrhagics, given in full dose and for a limited period only. They should never be given during the acute or chronic stage of the disease. Of these the pure yellow santal oil is by far the best: it is put up in five- and ten-drop capsules, of which one or two are given an hour after meals. If the santal oil is not obtainable or is not well borne by the stomach we may substitute capsules

of copaiba, or a combination of copaiba and cubebs, which sometimes prove of value, though not as efficacious as the oil of sandalwood.

If, as is sometimes the case, the antiblennorrhagics cause gastro-intestinal disturbances, cutaneous rashes, or renal congestion with pain and uneasiness in the lumbar region, and even albumin and hyalin casts in the urine, they must be discontinued for a time, and when resumed, taken in smaller quantity.

When the discharge decreases in amount and becomes sticky and mucoid in character, it is well to discontinue the use of these remedies, as they are apt, if continued for too long a period, to delay the cure by overstimulation and irritation of the urethral mucous membrane.

If the foregoing treatment has been successful, as it usually is in the majority of cases, the patient now has but a trifling urethral discharge, sometimes only seen in the morning, with flakes and shreds and perhaps a little free pus and mucus in the urine.

The treatment for this condition is so similar to that for chronic gonorrhea or urethritis that the reader is referred to Chapter VII, where all the details will be found fully described.

TREATMENT OF ACUTE POSTERIOR GONORRHEA.

As soon as the symptoms of acute posterior involvement develop all injections and other instrumental treatment of the urethra must be suspended.

The patient should be kept very quiet and, if possible, put to bed for a few days, on a light, nutritious diet, with the testicles properly supported. The bowels must be kept freely open, as any fecal accumulation in the rectum is

liable to irritate the inflamed deep urethra and prostate gland.

Antiblennorrhagics are stopped, and in their place one of the following formulæ is given:

℞—Potass. citrat., ℥j
Tinct. hyoscyam., ♏ij–iij
Fld. ext. kav. kav., ♏ss
Aq., ad ℥viij—M.
Sig.—℥ss in water one hour after each meal and once during the night.

℞—Fld. ext. trit. repens,
Fld. ext. uvæ ursi, āā ℥iss
Potass. citrat., ℥ss
Aq., ad ℥iv—M.
Sig.—℥j–ij in water one hour after each meal and once during the night.

Still water may be taken in moderation. Hot-water bags over the bladder and on the perineum give relief, as do also rectal injections of hot saline solution at a temperature of 115° to 117° F.; or the hot sitz bath. If these means do not control the frequency in urination, pain, and tenesmus, we may be obliged to resort to opium suppositories in a guarded manner, using just enough of the drug to keep the patient comfortable.

If retention of urine occurs, it should be promptly relieved by catheterization with soft-rubber or silk catheters, as described on page 93.

When the frequency in urination, vesical tenesmus, and other acute inflammatory symptoms begin to subside, we may then carefully resume local urethral treatment, and allow the patient to be up and about.

There are some cases, however, which in spite of the above treatment show no improvement, as to their acute symptoms continue unabated for days and even weeks. In this class of cases great benefit will sometimes be

derived from the judicious use of small irrigations of warm boric acid or salt solution thrown into the deep urethra and bladder by means of a soft catheter and four-ounce syringe.

It is always advisable in acute posterior gonorrhea, but especially in the severe cases, to make occasional rectal examinations of the prostate, seminal vesicles and bladder base, as by this exploration we learn their true condition, and are prepared to treat efficiently and promptly any pus-formation that may occur in or about these structures.

CHAPTER IV.

COMPLICATIONS OF ACUTE ANTERIOR GONORRHEA AND THEIR TREATMENT.

BALANITIS.

Balanitis is an acute or chronic inflammatory process, attacking the mucous membrane of the glans penis, and if accompanied by inflammation of the mucous membrane lining the prepuce, is called balanoposthitis.

It is caused by uncleanliness or by allowing smegma or gonorrheal pus to collect beneath the foreskin, where it sets up more or less inflammation. The condition usually occurs in persons with a long, tight prepuce, a condition which prevents retraction and proper cleansing of the parts.

The mucous membrane becomes red, thickened, and covered with a thin, purulent, and very offensive secretion; this is followed by swelling of the glans penis, which may be covered with irregular patches of excoriation; these, if untreated, may go on to superficial ulceration.

Treatment.—The parts must be kept absolutely clean by washing in hot water, or hot bichloride solution (1 to 5000), and separated by means of absorbent gauze wet in a weak solution of sulphate of zinc, lead-water, or boric acid. (See Figs. 6, 7, 8, and 9—slit gauze dressing.)

When the acute process has subsided the preputial cavity may then be treated by careful cleansing and drying, and the application, night and morning, of a dusting powder composed of equal parts of aristol and powdered boric acid.

If the prepuce cannot be retracted, the subpreputial space may be washed out with any of the above solutions, or plain hot water, these being injected with an ordinary hand syringe or irrigator. If there is considerable swelling of the prepuce and glans penis, the patient must be kept on his back, with the penis enveloped in gauze, wet in cold lead-water, bichloride solution (1 to 5000), or aluminum acetate solution. When, as a result of the above treatment, the parts have returned to a normal condition, circumcision should be strongly advised.

PHIMOSIS.

Phimosis is that deformity of the prepuce which renders its retraction behind the glans penis impossible (Fig. 18).

The condition may be congenital or acquired; the latter results from a balanitis or balanoposthitis, which by its irritation causes edema, redness, and swelling of the prepuce, this swelling becoming so great as to cause narrowing of the preputial orifice.

The patient should be kept very quiet, in bed if possible, and the cavity of the prepuce thoroughly irrigated several times daily with hot bichloride solution, 1 to 5000. It is well to keep the penis enveloped in absorbent gauze, which is constantly wet with cold lead-water, mild bichloride solution, boric acid, or aluminum acetate.

Congenital phimosis is frequently complicated by bands or adhesions running between the glans and the inner surface of the prepuce, and may or may not give rise to mild or very severe attacks of balanoposthitis, with painful and annoying manifestations. (For the further discussion and treatment of this condition see Chapter XVIII.)

In acquired phimosis, after the acute condition has subsided, circumcision should be strongly advised as the only guarantee against a possible return of the affection. (See Chapter XVIII.)

Fig. 18.—Phimosis. (Author's case.)

PARAPHIMOSIS.

Paraphimosis is that condition in which the prepuce has been retracted or has slipped behind the corona glandis, and cannot be readily brought forward (Fig. 19). The small preputial orifice, which is now pushed back behind the corona, forms a band of constriction on the dorsal

surface of the penis, which, preventing return circulation, causes more or less deformity of the organ from edema. This strangulation of the penis may develop rapidly or gradually, and when well established, causes great discomfort, and if neglected, may even go on to ulceration and gangrene of the prepuce and glans penis.

FIG. 19.—Paraphimosis. (Author's case.)

Treatment.—The first requirement in the treatment of this condition is immediate reduction of the deformity. This can often be accomplished in the following manner:

The organ is thoroughly washed and dried, then with the two thumbs pressing on the end of the gland, and the index and ring fingers behind the constriction and corona (Fig. 20), the blood is entirely massaged out of the glans, which, being thus reduced in size and softened, is pushed back through the constricting ring and the prepuce drawn forward.

Should this procedure fail, owing to the tightness of the constriction, a small, longitudinal incision must be made completely through the constricting band, on the dorsal surface, after which the glans can be readily reduced and the prepuce brought forward, the little wound being dressed with sterile gauze, and the preputial cavity kept clean.

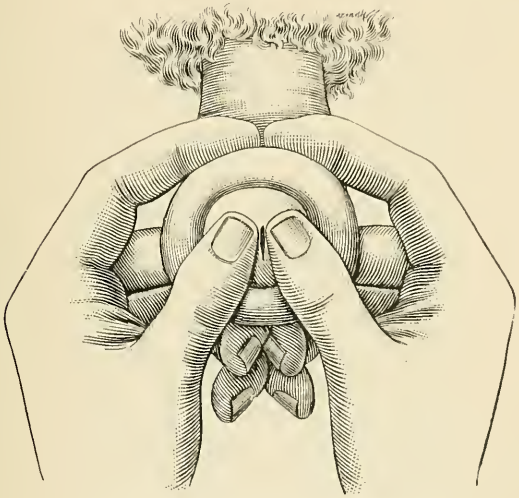


Fig. 20.—Reduction of paraphimosis.

As both these procedures are liable to be more or less painful, it may be necessary in some cases to give the patient a general anesthetic; a few whiffs of gas answering the purpose. Usually, however, a local anesthetic, such as 1 per cent. cocain or novocain, will be all that is necessary. In some cases freezing of the parts with the ethyl chloride spray will answer the purpose perfectly.

PERIURETHRAL ABSCESS.

Periurethral abscess occurs on the under surface of the penis, anywhere between the frenum and the penoscrotal junction, the region of the frenum being the favorite location. The abscess may be either uni- or bilateral, the latter being especially frequent near the frenum (Fig. 21).

FIG. 21.—Periurethral abscess. (Author's case.)

This condition occurs as a complication of both acute and chronic gonorrhea, and is the result of infection of a periurethral follicle, which, as a rule, goes on rapidly to abscess formation.

It appears at first as a small, hard mass, but when fully developed it has all the characteristics of an ordinary acute abscess. If very large, it may impinge on the caliber of the urethra and cause more or less obstruction to urination.

Treatment.—Patients suffering from this condition should be kept very quiet or put to bed, and all injections and instrumental treatment of the urethra stopped for a time. The inflamed parts should be kept at rest and covered with cold lead-water, alum acetate solution, or bichloride of mercury solution, 1 to 5000. In some cases this may lead to a disappearance of the swelling, but recurrence is the rule rather than the exception, especially with a fresh infection or an exacerbation of the urethritis.

If suppuration occurs, the abscess should be laid freely open, swabbed out with pure phenol or tincture of iodin and packed with sterile gauze.

It is important to remember that these abscesses should not be opened until suppuration is well advanced, as by that time the urethral orifice of the follicle is closed by a plug of inflammatory material, which prevents the urine from leaking into the abscess cavity, and causing a urinary fistula, which is very difficult to cure in this region.

FOLLICULITIS.

Folliculitis may occur at any time during the course of a urethral gonorrhea, and is due to infection of one or more of the little follicles which are situated between the layers of the prepuce (Fig. 22), either on its sides or dorsum, opening on its free border or on its mucous surface, or of those on the under surface and near the median line of the penis, even as far back as the scrotum.

In the acute stage the tissues about these follicles are acutely inflamed and frequently a small drop of pus exudes or can be pressed from the tiny orifice of the abscess cavity. If neglected, the infection passes into the subacute and then

into the chronic stage, and if unrecognized or untreated, is very liable to lead to the infection of women and to cause auto-infection of the bearer.

Treatment.—The parts should be cleansed in the usual manner, and affected follicles resected under local anesthesia, and a light dressing applied.

FIG. 22.—Preputial folliculitis. (Author's case.)

Paraurethral Folliculitis.—During the course of a urethral gonorrhea the follicle in either one or both lips of the meatus may become infected from the urethral discharge, thus giving rise to a small abscess, from the minute orifice of which a little drop of pus escapes or can be pressed. In some cases the follicle forms a sinus, opening on the mucous membrane of the fossa navicularis, thus constituting a true urinary fistula. This form of folliculitis, if uncured, may

cause the infection of women and auto-infection of the individual himself. In many cases of periurethral abscess, and of paraurethral folliculitis which we have examined, gonococci have been demonstrated, both by microscopic examination and culture experiments, in the abscess and urethral pus.

Treatment.—The little abscess must be laid freely open, curetted, and the raw surface touched with pure phenol, great care being taken to avoid cauterization of the adjoining mucous membrane.

COWPERITIS.

Cowper's glands, like the urethral follicles, may be the seat of abscess formation, the urethral infection traveling down their ducts, which open on the floor of the bulb, the glands themselves being situated between the anterior and posterior layers of the triangular ligament in the substance of the compressor urethræ muscle. As a rule, but one gland is affected at a time. At first the abscess is situated in the perineum on either side of the median line, but if large it may break through the anterior or posterior layer of the triangular ligament and burrow forward or backward a long distance along the urethra, and by pressure on the canal, interfere markedly with urination, or even cause complete retention (Fig. 23). We have recently seen a case in which the abscess not having been incised, a cyst had formed which resulted in chronic and complete retention lasting nearly two years, necessitating catheterization four times a day during that entire period. Excision of the cyst afforded complete relief.

Treatment.—Whenever a cowperitis develops the patient must be kept in bed, and all urethral instrumentation stopped. If fluctuation cannot be detected, cold lead-water, aluminum acetate, or bichloride of mercury solution, applied locally, may cause resolution in some cases; if, on the other hand, fluctuation can be plainly felt, the pus must be immediately evacuated.

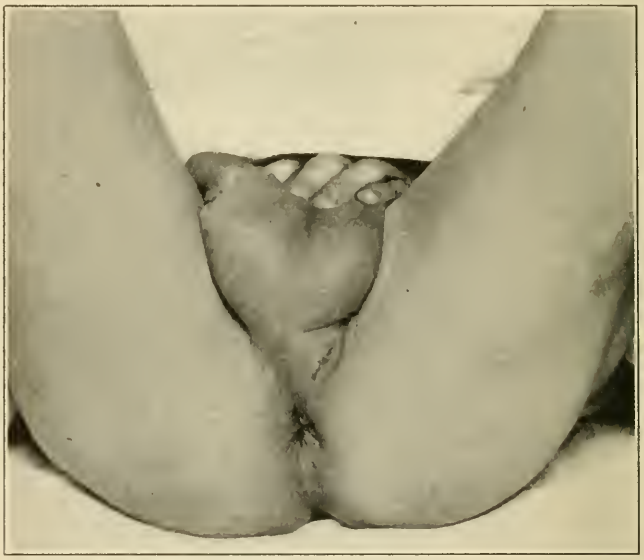


FIG. 23.—Suppurative cowperitis, left side. (Author's case.)

The patient, having been anesthetized, is properly prepared for operation and placed in the lithotomy position. A full-sized sound is then passed to the deep urethra, and held there directly in the median line by an assistant, thus rendering the urethra prominent and preventing it from being cut or injured during the operation, as in many of these

cases, after evacuation of the abscess, the bulb of the urethra can be distinctly seen hanging in the wound, and is thus rendered liable to injury if not made prominent by a sound. The abscess is then freely incised; if burrowing has occurred in any direction, it must be followed up by free incisions which thoroughly efface all blind pockets or cul-de-sacs. The abscess cavity is then irrigated with bichloride of mercury solution, packed lightly with sterile gauze (to prevent pressure on the urethra, with consequent retention of urine), and covered with a large dressing, held in place by a T-bandage or double spica.

LYMPHANGITIS.

Inflammation of the lymphatic vessels of the penis may occur during the acute stage of gonorrhea or urethritis. The vessels can be felt as hard and painful cords running along the dorsum of the organ up into the groins, where they empty into the inguinal glands. The penis becomes edematous and enlarged, and the course of the lymphatics is marked by red lines beneath the skin. Suppuration rarely, if ever, occurs.

Treatment.—The patient should be kept in bed and the penis enveloped in gauze kept wet with cold lead-water, aluminum acetate, or bichloride of mercury solution. All intra-urethral treatment should, of course, be suspended for a time.

ADENITIS.

The inguinal glands frequently become enlarged and tender during an acute gonorrhea, but, fortunately, they very rarely suppurate.

Treatment.—Patients in whom this complication occurs should be kept as quiet as possible, or put to bed, and a cold wet dressing of aluminum acetate or bichloride of mercury solution (1 to 500) is applied, over which is placed an ice-cap.

If in spite of the above treatment suppuration occurs, the pus must be immediately evacuated by free incision or by puncture followed by irrigation and injection of the abscess cavity with iodoform ointment. (For the details of these measures see page 217.)

CHAPTER V.

COMPLICATIONS OF ACUTE POSTERIOR GONORRHEA AND THEIR TREATMENT.

PROSTATITIS, ACUTE AND CHRONIC.

Acute prostatitis is a very common complication of acute posterior gonorrhea.

The inflammation in the posterior urethra spreads along the prostatic ducts and the gland becomes hyperemic and swollen. This gives rise to a sense of fulness in the perineum and rectum, accompanied by vesical and rectal tenesmus, with more or less pain in the prostate as the fecal masses press upon it as they pass through the rectum.

In some cases there is great difficulty in urination, which may go on to complete retention. Frequently there are painful nocturnal pollutions, which are sometimes bloody. Rectal examination shows the gland to be enlarged, hot, and painful; firm and tense in some cases, but soft and boggy in others. The slightest pressure by the examining finger is exceedingly painful and causes an exudation of purulent prostatic fluid from the meatus.

As a general rule, the congestion subsides as the urethritis improves, but there are some cases in which the inflammation goes on to abscess formation. This complication, when it does occur, is a very grave and sometimes even fatal one, unless promptly and radically treated.

There may be one large abscess, situated in either lateral lobe, or the posterior median portion; or several smaller ones scattered irregularly throughout the gland substance.

Unless recognized and evacuated, the abscess may rupture either into the bladder, urethra, rectum, peritoneal cavity, or perineum; rupture into the urethra being the most frequent. Suppuration is ushered in by an agonizing and constant throbbing pain in the prostate, sweating rigors, rise of temperature, and frequent and painful dribbling of the urine, which may even go on to complete retention, caused by occlusion of the prostatic urethra and by compressor spasm.

Rectal examination shows the prostate to be enlarged, hot, exquisitely painful, and throbbing. Fluctuation is readily detected if the abscess points toward the rectum, but with more difficulty if in other directions. In some cases the gland is so swollen and tender that only the finger-tip can be introduced into the rectum.

If the abscess ruptures into the urethra, as it frequently does, either spontaneously or as the result of catheterization for retention, the patient experiences a sudden sensation as if something had "broken or given way at the neck of the bladder," and immediately passes more or less blood-stained and usually foul-smelling pus and urine by the urethra, following which (rupture of the abscess) there is a sudden cessation of all the above painful and distressing symptoms, with a corresponding drop in the temperature.

Treatment.—Patients suffering from acute prostatitis should be put to bed immediately. All antiblenorrhagics, injections and instrumental treatment must be stopped and the urine rendered bland by copious draughts of water and the use of one of the following formulæ:

℞—Potass. citrat., ℥j
Tr. hyoscyami, ♏ij–iij
Fld. ext. kav. kav., ♏ss
Aq., ad ℥viij—M.
Sig.—℥ss in water one hour after meals and during the night.

℞—Potass. citrat., ℥j
Tr. hyoscyami, ♏ij–iij
Inf. buchu., ad ℥viij—M.
Sig.—℥ss in water one hour after meals and at night.

The bowels should be moved freely every day, using vegetable cathartics for the purpose. The use of salines is inadvisable, owing to their magnesium sulphate content, which renders the urine irritating. Hot-water bags over the bladder and perineum are often useful. Very valuable also are hot rectal irrigations of normal salt solution given daily or twice a day by means of the author's soft-rubber tubes (Fig. 24) in the following manner:

The patient lies down on his side with the buttocks near the edge of the bed or table. A five-quart douche bag filled with saline solution, at a temperature of 115° to 117° F., is so suspended that its lower end is about a foot above the patient's hips. The author's double tube, thoroughly lubricated with vaselin, is now inserted very gently for a distance of about three inches, so that the eye of the inflow tube rests against the gland. The fluid in the bag is now allowed to flow slowly into the rectum through the inflow tube, and out again through the outflow tube, the posterior aspect of the prostate being thus continually bathed with the hot saline solution. Each treatment should last from twenty to thirty minutes. By the use of a bath thermometer in the douche bag and the addition of more hot saline, from time to time, the irrigating fluid can be kept constantly at proper temperature.

These irrigations may sometimes result in the develop-

ment of hemorrhoids, but we have found that the liberal use of carbolized vaselin as a lubricant for the tubes prevents this complication in the vast majority of cases. Should hemorrhoids develop the irrigations are stopped for a few days, and the patient told to use suppositories of tannic acid.

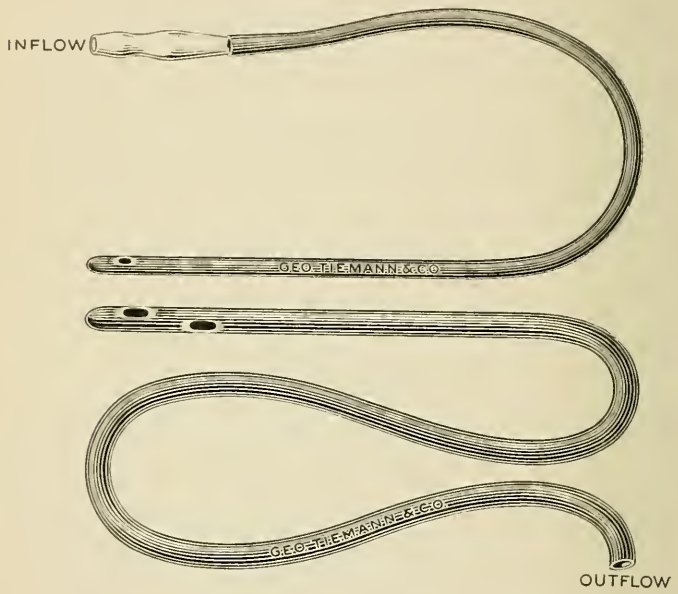


FIG. 24.—Author's double-current, soft-rubber rectal irrigating tubes.

After each of these treatments the patient should be directed to rest for a short time, if possible. In addition to the above measures the use of the hot sitz bath taken at bedtime will often prove very beneficial in lessening pelvic congestion. Very rarely suppositories of morphin

or opium, with belladonna, may have to be given to control the pain and tenesmus.

Should retention occur, the urine must be drawn with a soft-rubber or woven-silk catheter, and a little warm boric acid solution injected into the bladder and allowed to remain. It is also good practice to gently irrigate the urethra with the same solution as the catheter is slowly and carefully withdrawn. Catheterization failing, we are then obliged to resort to suprapubic aspiration of the bladder. (See page 180.)

Regular, systematic examination of the prostate, per rectum, will keep us informed as to the condition of the gland and the possibility of abscess formation.

Should abscess of the prostate develop, immediate operative treatment is imperative.

The pus may be evacuated by either of the following methods:

First Method.—The perineum having been prepared and draped as usual, the patient, under general anesthesia, is placed in the lithotomy position and a grooved staff is passed to the bladder and held there exactly in the median line by an assistant, who at the same time retracts the scrotum, thus exposing the operative field and rendering the urethra prominent, which prevents its injury during the operation. Great care must also be taken not to wound the rectum, which accident can be prevented by thorough retraction of the wound. A longitudinal incision is then made in the median raphe of the perineum, extending to within half an inch of the anus and carried far enough forward to give a good, free wound, at the bottom of which the prostate is found. The abscess is then freely incised, irrigated with hot saline solution, and packed with moist

sterile gauze. An ordinary gauze dressing is applied and held in place by a T-bandage.

Second Method.—In some cases the abscess is found to be difficult of access by this method. Under such circumstances the urethra should be opened near the apex of the prostate, using the staff as a guide, as in the operation of external urethrotomy (described on page 165). The forefinger is then introduced into the canal and pushed back into the bladder, dilating the prostatic urethra and splitting the lateral lobes of the prostate, thus opening up any abscess cavities in the gland. All partitions between separate cavities should be thoroughly broken down to insure free drainage. A large perineal tube is then passed through the perineal wound into the bladder, and secured in place by a heavy silk suture; the wound is lightly packed with gauze and a dressing applied as above.

Chronic Prostatitis.—Chronic prostatitis, as a result of acute or chronic posterior gonorrhea, or urethritis, is of very frequent occurrence, and is often the cause of chronic urethral discharges. It must be remembered that chronic prostatitis may also be the result of posterior urethritis, caused by excessive masturbation in young boys, and by sexual excesses and abnormalities in men of riper years; also, by long-continued and ungratified sexual desire. A chronically congested condition of the prostate is frequently observed following some of the so-called abortive methods of treating acute gonorrhea, especially the Janet method, and the forcible injection of solutions into the deep urethra and bladder by means of a large hand syringe.

Excessive motor-cycling and horseback riding, and especially the all too prevalent "withdrawal" during intercourse, to prevent conception, are also, very potent

causes of chronic posterior urethral congestion and prostatitis.

Symptoms.—The symptoms of chronic prostatitis are very marked in some cases and practically absent in others. There may be some frequency in urination, increased by sexual and alcoholic indulgences; nocturnal pollutions and premature and even painful ejaculation may be present, the ejaculate being blood-stained in some instances. Some subjects lose their sexual desire, or may even become totally impotent. The urine may be clear or more or less cloudy, as a result of the posterior urethritis, which is almost always present in these cases, and which gives rise to a varying amount of urethral discharge.

In advanced cases there may be an oozing of prostatic fluid from the meatus after urination and defecation, especially when the bowels are constipated; this greatly alarms nervous and excitable individuals, as they think they are losing their seminal fluid.

Some subjects complain of a sensation of fulness and distress in the rectum and perineum, which is greatly increased by defecation and coitus, also by long walks, overexercise, motoring, bicycle and horseback riding, and by standing a long time. Catching cold aggravates any or all of the above symptoms.

Diagnosis.—The diagnosis of chronic prostatitis can only be arrived at by making a careful rectal examination, when the gland will be felt (Fig. 25), either enlarged, tender, and boggy, or very tense and firm. Digital pressure on the gland will usually cause an oozing from the meatus of prostatic fluid, which should always be collected and examined microscopically. As a general rule, the enlargement is most marked on the left side.

Treatment.—If the gland is soft and boggy, it should be massaged about every five or seven days; but if firm and tense, very little if any benefit will, as a rule, be derived from this treatment, unless the massage is preceded for a week or ten days by daily rectal irrigations of hot saline solution,

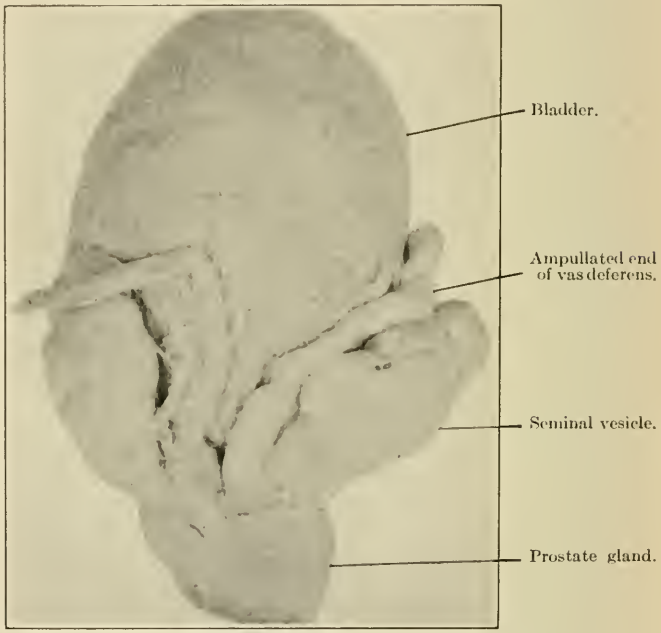


FIG. 25.—Photograph of bladder base. (College of Physicians and Surgeons.)

which soften the gland and permit the expression of its contents. Massage is always contra-indicated when there is a well-marked pyuria, owing to the danger of setting up an epididymitis.

The chronic urethrocystitis, which is found in conjunction

with this type of prostatitis, should be handled in the manner described in the chapter devoted to it. (See Chapter VII.)

The patient's general condition should be looked into and improved by general hygienic measures and tonics. Other local treatment of the prostate, besides massage and hot irrigations, consists in the use of one of the following rectal suppositories, used once or twice daily:

℞—Ung. hydrarg. (50 per cent.),	gr. xx
Antipyrin,	gr. v
Ichthyoli,	gr. v–x

The following formula will also be found of value in some cases of chronic prostatitis:

℞—Ext. belladon.,	gr. $\frac{1}{3}$
Collargol,	gr. iij
Anesthesin,	gr. x
Ol. theobrom.,	q. s.
M.—Ft. suppos. No. 1.	
Sig.—Use one suppository at bedtime.	

Considerable benefit may also be derived from the use of the Oudin high-frequency spark applied to the prostate by means of a rectal electrode (Fig. 26), every week or ten days.

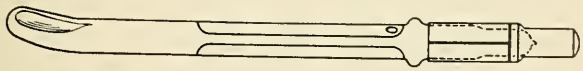


Fig. 26.—Glass rectal electrode.

EPIDIDYMITIS AND EPIDIDYMO-ORCHITIS.

Epididymitis is one of the most frequent complications of acute posterior gonorrhea, and consists of an acute inflammation of the epididymis, which, if it extends to the testicle, is called epididymo-orchitis.

In severe cases the vas deferens is also involved in the inflammatory process (acute funiculitis), and the cavity of the tunica vaginalis may be more or less distended with serum. This condition is spoken of as acute hydrocele, and may either disappear spontaneously or remain as a chronic process.

Epididymitis or epididymo-orchitis may appear during any stage of a gonorrhea, either spontaneously or as the result of trauma, such as violent physical exertion, unskilful instrumentation, etc.

It is the result of an extension of the inflammatory process from the floor of the posterior urethra into the ejaculatory duct, and thence to the epididymis and testicle. It is unilateral in the majority of cases, although both glands may be attacked at the same time, or successively.

Symptoms.—The symptoms of epididymitis and epididymo-orchitis will be described together, as they are practically the same. The patient begins to complain of pain in the testicle, and a dragging, aching sensation in the iliac fossa and groin which extends down the cord into the testis.

There is a rise in temperature, often accompanied by chilly sensations or a well-marked chill, which is followed by a feeling of general malaise. As the inflammation in the epididymis and testicle increases, all of the above symptoms become more marked, the temperature sometimes going to 105° F.; the pain in the testicle, groin, and lumbar region, which may even run up into the kidney, becomes so great that the patient has to lie down, supporting the scrotum with his hand. The intensity of these symptoms varies greatly in different individuals, some being compelled to go to bed, while others are up and about, attending to their ordinary duties. The scrotum is hot, red, and edema-

tous. The epididymis, either in part or in whole, is enlarged, hard, and exquisitely tender; if the testicle be involved, it also is very painful, firm, and greatly enlarged.

There may be an acute hydrocele, which gives a sense of fluctuation and which may be transilluminated. The entire cord is sometimes painful and thickened, and can be felt as far up as the ring (acute funiculitis).

Fig. 27.—Author's "bridge" for an acutely inflamed testicle. (Author's case.)

The duration of the attack depends on the treatment, and whether the epididymis only or epididymis and testicle, be involved.

Treatment.—The patient should be put to bed, given a brisk cathartic and have the general treatment for acute posterior gonorrhea. The scrotum is supported by a band of zinc oxide plaster (see Fig. 27), three or four inches wide, which passes beneath the scrotum to each thigh, care being taken to have the thighs, legs, and inner borders of the feet close together before applying the plaster. If there is

much hair on the thighs it should be shaved off to prevent pain when the plaster is removed.

The scrotum, supported as above described, is surrounded with absorbent gauze, which is kept saturated day and night, with cold lead-water; or a saturated solution of

FIG. 28.—Author's dressing for subacute or chronic epididymo-orchitis. (Author's case.)

aluminum acetate, or, in some cases, a 20 per cent. guaiacol ointment spread on gauze. This dressing should envelop the entire scrotum and extend up into the groin on the affected side. Over this should be placed an ice-cap, which must be removed for a few minutes, every hour or two, to prevent too great a chilling of the tissues.

When the acute inflammatory symptoms have subsided, as a result of the above treatment, an ointment of 20 per cent. ichthyol is spread over the scrotum, which is then surrounded by a layer of lint or non-absorbent cotton, over which is placed a piece of oiled silk or rubber tissue, the whole dressing being kept in position by a snug suspensory bandage. (See Fig. 28.) The patient is allowed to get up when the local pain and tenderness have disappeared. If there is very marked hydrocele, great relief can often be afforded by aspiration of the fluid, great care being taken not to wound the testicle, or to infect the sac.

Of late years some surgeons have advocated the operative treatment of acute epididymitis devised by Hagner. This consists of exposure of the epididymis, by an incision through the overlying scrotum, followed by longitudinal incision through the capsule or by multiple puncture of it with a good-sized straight needle or bistoury. In the author's experience the operation offers no advantage over the treatment outlined above; in a large series of parallel cases the pain and temperature were relieved more rapidly and the time spent in bed was considerably less in those patients that were treated by the more conservative, non-operative method. If true abscess of the epididymis can be demonstrated the pus should be evacuated by free incision and the cavity irrigated and drained.

The induration in the epididymis, which is the result of the inflammatory process, may sometimes be reduced by the constant use of 20 per cent. ichthyol, compound iodin, or 50 per cent. mercurial ointment. The use of the Oudin high-frequency current, applied to the testis and epididymis will sometimes assist in the absorption of the exudate, which, if left untreated, may result in partial

and even complete sterility, if both epididymes have been involved. In the latter case implantation of the vas, cut through a short distance above the epididymis, directly into the testis itself, as advocated by Martin, will sometimes permit of the passage of spermatozoa into the ejaculate, thus relieving the patient's sterility.

SEMINAL VESICULITIS.

By seminal vesiculitis or spermatocystitis is meant an inflammation of the seminal vesicles, which may be either acute or chronic. It may occur at any time during the course of the disease. The inflammation passes directly from the floor of the posterior urethra through the common ejaculatory duct to either one or both vesicles.

The symptoms of acute seminal vesiculitis are practically the same as those of acute posterior urethritis or acute prostatitis, the patient having frequent and painful urination with vesical and even rectal tenesmus. There may be painful nocturnal pollutions stained with blood. The patients usually complain of a feeling of fulness just within the anus or in the perineum. In severe cases there is more or less fever, accompanied by a feeling of general malaise.

The diagnosis is arrived at by making a rectal examination, when the vesicle or vesicles can be felt as hot, swollen, tender bodies situated just beyond the base of the prostate and running upward and outward (Fig. 25).

For this examination, the patient should be standing up, with the trunk bent at right angles to the thighs, the heels about a foot apart, and the palms of the hands resting on the seat of a chair. The index-finger is used for examination

and should be well anointed with vaselin and covered with a thin rubber finger-tip or glove.

The treatment is the same as that for acute prostatitis and posterior urethritis, to which the reader is referred.

Should the inflammation go on to abscess-formation, as is rarely the case, the patient must be anesthetized, put in the lithotomy position, and the pus evacuated by a vertical or semilunar incision through the perineum just in front of the anus, and the abscess cavity drained, great care being taken not to wound the urethra or rectum. In a good many cases the process can be relieved by massage of the vesicle, by which the pus is expressed into the urethra; operation should not usually be resorted to until this procedure has been given a trial.

The steps in the operation are given in the section dealing with the treatment of chronic seminal vesiculitis.

Chronic seminal vesiculitis may follow the acute form, or be caused by the extension backward of a chronic posterior urethritis or prostatitis.

The symptoms of chronic seminal vesiculitis are varied and differ greatly in different individuals, some complaining that they are becoming impotent, others that they have nocturnal pollutions and premature ejaculations, both of which may be blood-stained. These conditions may or may not be associated with a mucoid or mucopurulent urethral discharge, which varies greatly at different times. Some complain of a sense of weight and fulness in the rectum and perineum, while others are absolutely free from these sensations, the only symptom of the disease being a cloudy urine with flakes and slight discharge at the meatus. Some patients have constant and greatly increased sexual desire, with perhaps little relief after intercourse.

The symptoms of chronic seminal vesiculitis are so similar to those of chronic prostatitis and posterior urethritis that a correct diagnosis can only be arrived at by making a careful rectal examination, as described in the acute form. When diseased, the vesicle or vesicles may often be plainly felt by the finger, running up and out from the base of the prostate gland. On the other hand, the presence of a chronic gonorrheal arthritis, which resists all treatment, or the persistence of other symptoms of gonorrhea over long periods of time without improvement are often the only indications on which the diagnosis of chronic vesiculitis may be made.

For routine treatment the vesicle or vesicles can be thoroughly massaged about once a week, and the patient given the regular treatment for chronic posterior urethritis and prostatitis, the details for which will be found fully described in Chapters V and VII.

In a certain number of cases which do not respond to this treatment Fuller and others have resorted to incision and drainage of the vesicles by the perineal route. The technic for approaching the vesicles differs according to the choice of the operator.

URETHROCYSTITIS.

Urethrocystitis, either acute or chronic, is not an uncommon complication of posterior gonorrhea, or urethritis, being caused by an extension backward of the inflammatory process from the posterior urethra into the bladder. As a rule, the inflammation is limited to the mucous membrane for an inch or so surrounding the vesical orifice of the urethra, as may

be seen by cystoscopic examination, the mucous membrane over the trigone being reddened and edematous. It may extend, however, and involve the entire bladder surface, thus constituting a true cystitis.

The symptoms of acute urethrocystitis are frequent and painful urination, vesical tenesmus, and in severe cases, terminal hematuria. In short, they are practically the same as those of acute posterior gonorrhea or urethritis, except perhaps that they are more persistent and severe in character, the patient also complaining of a constant deep-seated pain over the bladder, which is intensified at the close of micturition.

If in these cases we employ the two- or three-glass test, the urine in all of the cylinders will be cloudy from pus and mucus, but especially so in the second or third cylinders, which may also contain blood from the congested mucous membrane of the deep urethra and vesical neck. This hematuria may, occasionally, be so severe that the urine, which is usually acid in these cases, may be rendered neutral, or even alkaline in reaction by the blood and pus.

As the inflammation passes into the chronic stage the above symptoms all become much less marked and in some cases even almost disappear. As a general rule, these patients complain of an uncomfortable feeling after urination, as if the bladder were not emptied, and of a disagreeable desire to strain out the last drops of urine; in short, they have mild vesical tenesmus. If after urination a soft catheter is passed to the bladder it will draw a drachm or so, or even more, of retained or residual urine, the result of the congested and thickened condition of the mucous membrane about the vesical orifice, which prevents the bladder from emptying itself normally.

Treatment.—In the acute stage of urethrocystitis the patient should be kept very quiet, or in bed, with hot applications over the bladder and on the perineum. Hot sitz baths and hot rectal irrigations of saline solution afford great relief. All instrumentation of the urethra must be suspended, the patient put on a light, nutritious, and non-irritating diet, and the urine kept bland by means of the following prescription:

℞—Fld. ext. trit. repens,
Fld. ext. uvæ ursi., āā ʒiss
Potass. citrat., ʒij–iij
Aq., ad ʒiv—M.
Sig.—ʒj in water one hour after meals and during the night.

Tenesmus, if severe, may have to be controlled by the judicious use of opium or morphin, either in suppository, internally, or by hypodermic injection.

The patient may drink any bland water, but not in too great quantity.

It is very important to keep the bowels moving freely, and for this purpose we may employ a little calomel or any good cathartic pill.

When as a result of the above treatment the acute inflammatory symptoms begin to subside, it is time to commence irrigation of the deep urethra and bladder, using at first warm boracic acid solution, and later permanganate of potash or silver nitrate. The technic for this treatment will be found fully described in the sections devoted to chronic urethritis, and to these the reader is referred.

CYSTITIS.

Gonorrheal cystitis, by which is meant a suppurative inflammation of the entire vesical mucous membrane, is an

extremely rare complication of acute or chronic posterior gonorrhea. It may be either acute, subacute or chronic in character, and is usually the result of a mixed infection, in which the gonococcus plays little or no part.

The symptoms of acute gonorrheal cystitis consist of pain over the bladder and sacrum and increased frequency in urination, which is very painful, especially at its close, and is followed by more or less tenesmus and sometimes blood. These patients are really sick, having a rise of pulse and temperature and a feeling of general malaise and lassitude.

As the process becomes subacute and then chronic, all of the above symptoms lose their severity and intensity, the patient complaining of some pain and urgency in urination, and uneasy sensations in and about the bladder and pelvis.

The urine, during the acute stage, is normal in odor and acid, though rendered opaque by pus, tissue elements and bladder epithelium. In a well-established chronic, case, however, it becomes foul and alkaline, with coagulation of the pus into ropy and gelatinous masses, owing to bacterial decomposition. In any stage, if it is passed into three glasses, all will be cloudy with pus and shreds, especially the last.

Treatment.—During the acute stage of the disease the patient should be kept in bed, and on a light nutritious diet, avoiding alcohol and coffee, and anything that is highly spiced or seasoned that may in any way irritate the urinary tract. Water may be taken, but not in too large quantities. The bowels must be moved freely once in twenty-four hours by means of any reliable cathartic pill. Hot applications over the bladder and on the perineum give much relief, as do also the hot sitz bath and rectal irrigation of hot

saline solution, taken once or twice daily. If the pain and tenesmus are very severe, we may have to resort to the guarded use of opium or morphin, or belladonna, either by suppository, internally, or by hypodermic injection.

The urine must be kept bland by the administration of citrate of potash, either alone or combined with hyoscyamus, uva ursi, and triticum repens, as given in the formulæ for acute posterior urethritis and urethrocystitis.

As a result of this treatment the majority of cases pass quite rapidly into the subacute and chronic stage, when the patient is allowed to be up and about, and given a more liberal diet. Alkalies can now be discontinued and the patient given boric acid in full dose, as in the following formula:

℞—Ac. boric., ℥ijss
Tr. hyoscyami, ℥ij
Aq., ad ℥viij—M.
Sig.—℥ss one hour after meals.

If in spite of the above treatment the urine still remains alkaline or neutral in reaction, a normal acidity can usually be obtained by the administration of urotropin or helmitol in full dose.

Now is the time to begin bladder irrigations, given very gently and carefully by means of a small catheter and four-ounce hand syringe in the following manner: The patient urinates and then lies comfortably on his back; the surgeon then passes a small soft-rubber or silk catheter, properly cleaned and lubricated (see Fig. 17), into the bladder, and gently injects a warm and non-irritating medicated solution, until the patient has a desire to urinate or feels uneasy in any way, when the fluid is immediately allowed to escape through the catheter. This may be repeated a few

times, the catheter being finally withdrawn, leaving several ounces of solution in the bladder, which, as the patient voids it, medicates the mucous membrane of his prostatic urethra, which was the starting-point and cause of the cystitis, so that in this manner we treat not only the bladder, but also the entire length of the urethral canal.

As a rule, the irrigations are given once daily, beginning with warm boric acid or salt solution, and later zinc sulphate and alum solution (1 to 3000 up to 1 to 1000) followed, still later, by potassium permanganate (1 to 15,000 up to 1 to 2000), and finally by nitrate of silver solution, beginning with 1 to 20,000, and increasing slowly and guardedly up to 1 to 5000 or even stronger.

Complicating prostatis, seminal vesiculitis, or stricture should receive appropriate treatment.

URETERITIS, PYELITIS, AND PYELONEPHRITIS.

Among the very rare and infrequently encountered complications of posterior gonorrhea, or more accurately speaking, of gonorrheal cystitis, may be mentioned ureteritis, pyelitis, or pyelonephritis; the infection traveling upward from the bladder to the kidney by way of the ureters; or being carried to these organs through the lymphatics or blood stream. The diagnosis of which kidney is involved is greatly aided by catheterization of the ureters through the cystoscope. These complications are generally observed in persons who have had antecedent vesical disease, or in whom there is some obstruction or hindrance to the free outflow of urine from a urethral stricture or prostatic enlargement. As a general rule, but one kidney is involved.

CHAPTER VI.

CHRONIC ANTERIOR AND POSTERIOR GONORRHEA.

Chronic gonorrhea, also commonly known as gleet, is spoken of as chronic anterior gonorrhea, when the disease is situated somewhere in the anterior urethra; as chronic posterior gonorrhea, when in the posterior urethra; as chronic anteroposterior gonorrhea, when the entire length of the urethra is involved; and as chronic urethrocystitis when the disease has invaded the bladder to a limited extent around the urethral orifice.

A gonorrhea is called chronic when it has existed for more than eight or ten weeks, and has lost all of its acute inflammatory manifestations.

The lesions of chronic gonorrhea consist of a small round-cell infiltration into the submucous connective-tissue layer, and a chronic catarrhal inflammation of the mucous membrane itself, whose normal cylindrical epithelium, as a result of the gonorrheal process, has been destroyed in patches, and as healing occurs, replaced by the flat pavement variety, thus leaving the canal in a more or less thickened and rigid condition.

The causes of chronic gonorrhea are many, prominent among them being sexual and alcoholic indulgences during the declining stage, patients thinking themselves cured at that time as they see no discharge at the meatus, and therefore stopping treatment at this, the most important period in their disease.

Gonorrhea is also apt to run a chronic course in debilitated, run-down, and anemic subjects, and in those who will not, or cannot, take sufficient rest or proper treatment in the acute inflammatory stage of the disease.

The numerous so-called abortive methods, with strong injections, retrojections, irrigations, and endoscopic applications during the acute inflammatory stage, are very liable to leave the patient with a thickened urethra, congested prostate, and a chronic discharge that is most rebellious to treatment.

Chronic congestion and inflammation of the prostate gland, as a result of gonorrhea and sexual errors and excesses, is a frequent cause of chronic urethral suppuration, and should therefore not be overlooked in the treatment of these cases.

Seminal vesiculitis is undoubtedly the etiological factor in some cases of chronic gonorrhea, but is rare, as compared to chronic affections of the prostate.

An abnormally small meatus, or a condition of phimosis, associated with balanoposthitis, may, from the irritation they produce, be important factors in the continuation of a chronic urethritis.

Uncured preputial, peri- or paraurethral folliculitis, or infection of any of the glands or follicles opening into any part of the urethra (Cowper's glands, the glands of Littre, and the crypts of Morgagni), may cause the lightening up, or prolongation of a gonorrhea; therefore these structures should receive due consideration and treatment.

Warty and polypoid growths in the urethra may, from the irritation they occasion, keep up a urethral discharge for a long time. They may be diagnosticated by endoscopic examination, which may be employed in chronic and rebellious cases.

Urethral stricture, resulting from a previous gonorrhea or a traumatism, may sometimes complicate and keep up a chronic urethral discharge, and must therefore not be forgotten in the examination.

CHRONIC ANTERIOR GONORRHEA.

The symptoms of chronic anterior gonorrhea are very variable: In some cases the lips of the meatus are glued together in the morning by the discharge which has accumulated in the urethra during the night; in others there is a variable amount of mucopurulent, mucoid, or serous discharge at the meatus, which is usually increased after sexual or alcoholic indulgence. In still other cases there is no gluing of the meatus, the only symptom of the chronic inflammation being flakes and shreds in the urine. In the majority of cases there is no visible discharge at the meatus during the day, as the urethra is so frequently flushed out by the stream of urine. Patients often complain of a dribbling of a few drops of urine after each act of urination; this is due to a loss of elasticity of the urethral walls as a result of the chronic catarrhal and exudative inflammation into the submucous connective-tissue layer, which leaves them in a more or less rigid condition, and unable to empty themselves normally.

The Thompson two-glass test, for the differential diagnosis of chronic anterior and chronic posterior gonorrhea, should not be relied on, as it is only applicable to acute cases associated with much suppuration.

The so-called gonorrheal flakes and shreds consist of moist scales made up of pus and epithelial cells, held together by fibrin or mucus; they are situated upon spots of con-

gestion, erosion, and superficial ulceration along the urethral walls, which mark the localities where the gonorrheal process has become localized. These congested, eroded, or ulcerated patches form the lesions of chronic gonorrhea, and are most commonly found in the bulbous urethra, as this portion of the canal is large (33 to 36 F.), has no capsule, is surrounded by erectile tissue, and being dependent, drains poorly; all of the above conditions greatly favoring a long-continued inflammatory process.

When the stream of urine strikes the edges of these moist scales it rolls them up, and they therefore appear as threads or shreds suspended in the urine, which may be either turbid or clear.

As healing advances the pus cells disappear, the flocculi being made up entirely of epithelial cells, which, when the case is cured, also vanish, leaving a clear, transparent urine.

In a general way it may be stated that the threads or shreds from the anterior urethra are usually long and thread-like in character, while those from the posterior urethra are lumpy and ragged in appearance, although too much reliance must not be placed on these distinctions. Microscopically both kinds are found to be composed of the same elements. The presence of spermatozoa, which may sometimes be discovered entangled in their meshes, is an aid in deciding on their place of origin, though not absolutely conclusive.

CHRONIC POSTERIOR GONORRHEA.

Although chronic posterior gonorrhea may sometimes occur alone, it is accompanied in the vast majority of cases by a chronic bulbous urethritis, as well as by some chronic

urethrocystitis, which in turn may be associated with prostatitis, or even seminal vesiculitis, which conditions must not be forgotten when planning treatment.

In these cases there is more or less increased frequency of urination with a feeling of discomfort either at the beginning or termination of the act, and sometimes a very slight discharge at the meatus, particularly in the morning. The urine may be clear, turbid, or cloudy, and contains shreds from the posterior urethra, which, as a rule, sink rapidly to the bottom of the glass. In some cases there are frequent nocturnal pollutions which may be bloody; in others premature ejaculation, associated with dull, painful sensations in the region of the prostate and perineum. These sexual manifestations are due to the congested and inflamed condition of the posterior urethra, prostate gland, and possibly, of the seminal vesicles.

The above symptoms vary widely in different individuals, in some, well-marked and constant, in others, very slight and only brought into activity by alcoholic and sexual indulgences, which cause a congestion of the posterior urethra and prostate, with a lightening up of the dormant inflammation.

If, as is usually the case, the patient also has an anterior gonorrhea, a more marked discharge will usually be present at the meatus.

CHAPTER VII.

TREATMENT OF CHRONIC ANTERIOR AND POSTERIOR GONORRHEA.

Before beginning any form of treatment, we should first ascertain the number, duration, severity, and complications of the preceding attack or attacks of gonorrhea, as this information will shed much light on the patient's present condition, and also aid greatly in the selection of a proper plan of treatment.

In all cases of chronic gonorrhea, the urine should be carefully examined. Its reaction, the amount of pus, epithelial cells, and bacteria, and the composition of the shreds should be ascertained. Any excess of phosphates, carbonates and urates should be noted.

If urination is painful the patient should take any of the alkaline mixtures alluded to above and drink freely of any bland water. Coffee, chocolate and cocoa and alcohol are to be stopped until the case is well under control, when they may be resumed in moderation. The diet should be nutritious, but simple, the patient avoiding all highly spiced and seasoned dishes. As soon as the pain or smarting on urination ceases, great benefit will be derived in many cases from the use of the antiblennorrhagics.

All sexual excitement must be strictly guarded against, as it causes urethral and prostatic congestion and thus retards a cure, as does also excessive exercise.

If the urine is cloudy from pus (pyuria) as well as gonorrheal flakes and threads, it is best to begin with retrojections or irrigations, which consist of throwing into either the anterior or posterior urethra several ounces of a warm medicated fluid. If, however, the urine is clear, or as a result of the above measures the pus disappears and nothing but threads remains in the clear urine, it is then time to stop retrojections or irrigations and substitute for them instillations, which consist of a drachm of a concentrated medicated solution, injected into the canal, the technic for which will be described in detail farther on.

If chronic gonorrhea is complicated by stricture of the urethra, prostatitis, seminal vesiculitis, an abnormally small meatus, or phimosis associated with balanoposthitis, these conditions should receive appropriate treatment which will be found fully described under these separate headings, to which the reader is referred.

TREATMENT OF CHRONIC ANTERIOR GONORRHEA.

The general rules just described having been minutely carried out, the anterior urethra is treated in the following manner, either by irrigations or instillations, according to the condition of the urine.

Irrigations should be given as follows: The patient passes his urine in order to flush out the canal; then a small, sterile soft-rubber or bulbous woven-silk catheter (see Figs. 15 and 16), well lubricated, is passed very gently into the bulb of the urethra. A large hand-syringe (Fig. 2) is then attached to the end of the catheter by means of a coupler (Fig. 2), and the warm medicated fluid injected slowly and gently into the bulb of the urethra, beyond

which it does not pass on account of the compressor urethræ muscle, but flows forward and escapes at the meatus.

In this manner all of the diseased areas in the anterior portion of the canal are brought into direct contact with the medicated solution.

The irrigations may be given daily or every other day, according to the results obtained, which can be ascertained by the patient's symptoms and sensations, and also the condition of the urine, which should be examined before each treatment.

On the alternate days the patient can use an ordinary hand-injection, if so desired, provided it does not cause irritation, which it sometimes does. The amount of solution used at each sitting varies from four to eight ounces, the fluid should always be warm, and thrown in with the utmost care and gentleness.

For irrigation solutions we use the following stock formulæ in the order given and manner described:

Solution I.

℞—Alum. crud.,
Zinc. sulphat., āā 1.00
Aq. destillat., 500.00—M.

Sig.—Add one-half (½) of an ounce of this solution to seven and a half (7½) ounces of warm boiled water, and inject. Increase strength from day to day until equal parts of solution and water are used, or even stronger, if so desired.

Solution II.

℞—Potass. permanganat., 1.00
Aq. destillat., 500.00—M.

Sig.—Add one-quarter (¼) of an ounce of this solution, to seven and three-quarters (7¾) ounces of warm, boiled water, and give an irrigation every day or every other day, increasing the strength slowly up to 1 to 1000 (1 to 16,000 to 1 to 1000).

Solution III.

℞—Argent. nitrat., 1.00
Aq. destillat., 500.00—M.

Sig.—Use in precisely the same manner as the second solution, increasing the strength very slowly, as the silver nitrate is liable to cause severe pain and irritation if used too strong (1 to 16,000 to 1 to 1000).

The following table will be found very convenient in making up the permanganate or silver solutions:

In an 8 oz. graduate; stock sol. (1 to 500).

℥ij of solution equals	1 to 16,000
℥ss of solution equals	1 to 8,000
℥j of solution equals	1 to 4,000
ʒij of solution equals	1 to 2,000
ʒiij of solution equals	1 to 1,300
ʒiv of solution equals	1 to 1,000

If, at about the end of the tenth or twelfth week of the disease, the patient still complains of a dribbling of urine from the meatus after urination, good results will often be obtained by the judicious use of warm, medium-sized steel sounds passed to the triangular ligament about once a week, and left in the urethra for about a minute; the pressure which the sound exerts helps to restore the lost elasticity of the urethral walls, and in that way cures this troublesome and disagreeable symptom. In the author's experience sounds are greatly to be preferred to any of the various dilators in use.

If, after using the above irrigations in the manner described the urine is rendered clear but still contains shreds and flakes, it is advisable to give the patient instillations of nitrate of silver in the anterior urethra. This method is fully described in the next section.

TREATMENT OF CHRONIC POSTERIOR GONORRHEA.

Before proceeding to discuss the treatment of chronic posterior gonorrhea it will be well to emphasize the fact that in the vast majority of cases of gonorrheal infection the entire length of the urethra and the bladder base become involved in the

process. Under these circumstances, of course, both the anterior and posterior urethræ must be treated in order to obtain a cure. Great care must therefore be taken in making a diagnosis of anterior involvement only.

The general lines of treatment described on page 89 having been instituted, the posterior urethra and a limited area of the bladder should be irrigated by retrojection.

The patient, having urinated in order to cleanse the canal, lies down, with head and shoulders elevated and muscles relaxed, and a small, sterile, soft-rubber catheter, properly lubricated, is gently passed, so that its eye lies just within the bladder, which will be shown to be the case by the escape of a drachm or so of retained urine. In some exceptional cases it will be found impossible to pass a soft-rubber catheter beyond the compressor urethræ muscle. For these cases we can substitute a No. 10 French woven-silk instrument, which, although more rigid than the rubber one, is flexible and less liable to cause irritation and compressor spasm than the metal instruments which are sometimes recommended for this purpose. The much-talked-of and overestimated spasm of the compressor urethræ muscle is, as a rule, caused by rough, rapid, and unskilful instrumentation, and will rarely, if ever, be encountered, provided the surgeon is gentle and uses flexible catheters in preference to metal ones.

A four-ounce syringe (Fig. 2) is attached to the catheter by means of a coupler with stopcock, and the warm medicated fluid thrown slowly and gently into the bladder. When the syringe is empty the stopcock is turned off, the syringe uncoupled, refilled, and more fluid injected until the bladder feels full, or the patient complains of a desire to urinate, when the catheter is slowly withdrawn into the bulbous

portion and the entire anterior urethra irrigated. The patient now stands up and passes the medicated fluid, which, having already acted on the base of the bladder, washes out the posterior urethra, and flowing through the anterior urethra, distends it as it rushes out, and in this manner medicates all of the congested, eroded, or ulcerated spots and patches along the canal.

The solutions used must always be warm and increased very slowly in strength, especially the permanganate of potash and nitrate of silver solution, which, if too strong, will set up intense vesical and rectal tenesmus, which may last for several hours. The fluid should always be injected with a four-ounce hand-syringe, as with it we know the exact amount of solution thrown in, the resistance offered by the bladder, and the force used; whereas, if an irrigator or fountain syringe were employed, none of the above valuable information could be obtained, and more or less damage might be done.

The amount of fluid used at each sitting varies, a good average being about eight ounces, although many bladders will not hold more than from one to four ounces at first; this is due to irritability of the posterior urethra, with more or less contraction of the bladder, which has been produced by the frequent calls to expel the urine during the acute attack; this irritability subsides rapidly under the treatment, and patients frequently speak of the comfort they experience after the first few irrigations.

If, in spite of the above treatment, carefully carried out, the urine does not clear up promptly, then the prostate, seminal vesicles, and ampullated ends of the vasa deferentia must be examined per rectum, and if found affected, treated as described in the sections devoted to these subjects.

If, after having used the irrigations or retrojections, the urine clears up, but still contains gonorrheal threads and tissue elements, it is advisable to change our plan of treatment by using small amounts of concentrated solutions; these are called instillations, and are given in the following manner (Fig. 29): The patient, having urinated, lies down or stands before the surgeon, who passes a small, sterile, soft-rubber or silk catheter, as before, into the posterior

FIG. 29.—Urethral instillation. (Original.)

urethra, if posterior urethritis or urethrocystitis exists, or into the bulb of the urethra, if there is only an anterior urethritis to deal with, and by means of the author's instillation syringe (Fig. 3), throws in about a drachm of a solution of nitrate of silver. When the posterior urethra is involved, half the syringeful is injected into it and the rest into the anterior urethra as the catheter is withdrawn. Before injecting the solution, any urine retained in the bladder must first be drawn off, in order not to decompose the medication.

The strength of the nitrate of silver solutions used should run from 1 to 16,000 for the first injection, up to 1 to 1000 or 1 to 500, or even stronger.

These instillations should be repeated daily or every other day, according to the results obtained and the strength of the solution used. In some rebellious cases we may be compelled to increase the strength of the silver solution up to 1 to 250, or even 1 to 100; this should be done very slowly and carefully, and the instillations given at longer intervals; our guide in these cases being the condition of the urine, which should be examined at each visit. In the same manner we may sometimes advantageously use 3 to 6 per cent. sulphate of thallin solution; as a rule, however, nitrate

Fig. 30.—Silk bulbous instillation catheter.

of silver is the most efficacious of all, and if intelligently used will produce a cure.

In some cases, where unusual thickening and edema of the mucous membrane makes a certain amount of pressure on the tissues and dilatation desirable, we may substitute for the ordinary rubber or silk catheter a bulbous silk catheter, as shown in Fig. 30.

The specially constructed metal instruments or drop catheters, which are sometimes recommended for instillations, should never be employed on account of the irritation and traumatism that they are liable to produce, even in skilful hands. If the surgeon fails to enter the deep urethra with soft-rubber and silk catheters it is proof positive that he is either very unskilful, or that the parts are in a far too irritable

and sensitive condition for any kind of local urethral medication. The Ultzmann drop catheter, which consists of a thick-walled silver catheter with capillary bore, and a glass and hard-rubber syringe, is the instrument usually employed by those who are opposed to soft-rubber instruments for urethral medication.

The use of the endoscope (urethroscope) in the treatment of chronic gonorrhea is frequently of service in those cases which have resisted the different forms of treatment already described.

The endoscope can only be employed to advantage in certain selected cases in the chronic stage of the disease, and by one who is accustomed to the appearance of the urethral walls, both in their normal and diseased states. By its aid we can examine with the eye the entire length of the anterior urethra, recognize polypoid or warty growths, areas of infiltration, congestion and erosion, diseased follicles, false passages, stricture, impacted stones, etc., and treat them locally by topical applications of various kinds.

It must be remembered, however, that the endoscope is an instrument of reserve, and should never be employed in a routine or careless manner, as its frequent passage through the urethral canal causes more or less irritation, distention, and congestion of this sensitive and highly vascular mucous membrane.

It should never be used in the prostatic portion of the urethra, where its relatively sharp edge, by pressure on the verumontanum and the orifices of the ejaculatory and prostatic ducts, causes more or less trauma and bleeding, as a result of which the author has not infrequently seen epididymitis, prostatitis, and even abscess of the prostate.

Should we desire to examine this region visually, the close-

vision urethrocystoscope is the instrument of choice, for with it we can not only reduce trauma to a minimum but also get a much clearer and less distorted view of the structures in the posterior urethra.

For general endoscopic work the most useful types of instrument are those constructed on the principle of the Luy urethroscope and the instrument devised by the author.

In the Luy instrument the light consists of a small, "cold" lamp, carried on a staff of such length that the

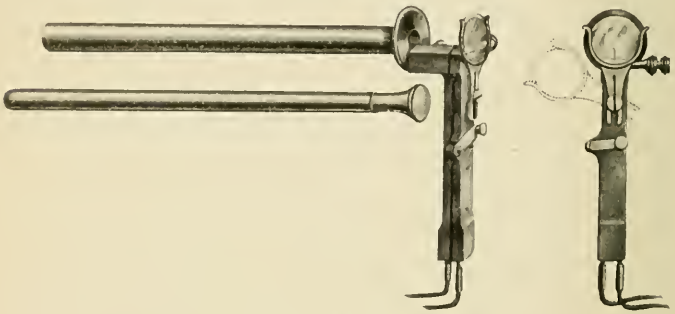


Fig. 31.—Luy's urethroscope.

lamp rests just within the distal end of the endoscopic tube (Fig. 31). This instrument gives an excellent view of the urethral walls, as the tube is slowly withdrawn, but has the disadvantage that the lamp may easily become covered with secretion or blood, thus cutting off the illumination, and that the lamp is somewhat in the way of applicators and other instruments.

To obviate these objections and to supply an instrument with unobstructed field, in which the operator can see the lesions while treating them, I have devised the present

urethroscope, which can be used either in the anterior or posterior urethra, and even in the bladder, where the ureteral orifices can be found and catheterized, small stones or foreign bodies removed, and the mucous membrane clearly seen.

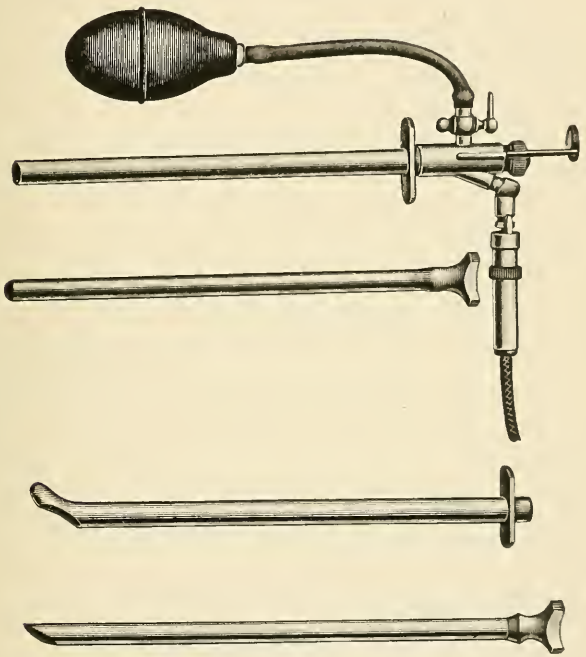


FIG. 32.—Author's operating and examining urethroscope.

The tubes for the anterior urethra are 5 inches long and those for the posterior urethra $6\frac{3}{4}$ inches, but can be lengthened or shortened according to the requirements of the case, and made in any caliber. The proximal ends of the obturators and tubes are milled so as to give the operator a

firm hold, and flattened above and below to prevent their rolling when laid down. The little lamp consists of a carbon filament in front of which is a planoconvex "collecting" lens, which gathers and projects the rays to the distal end of the tube where the field is seen in brilliant illumination. The lamp is held in a metal collar outside of the tube so that it does not encroach on the field, is not in the way

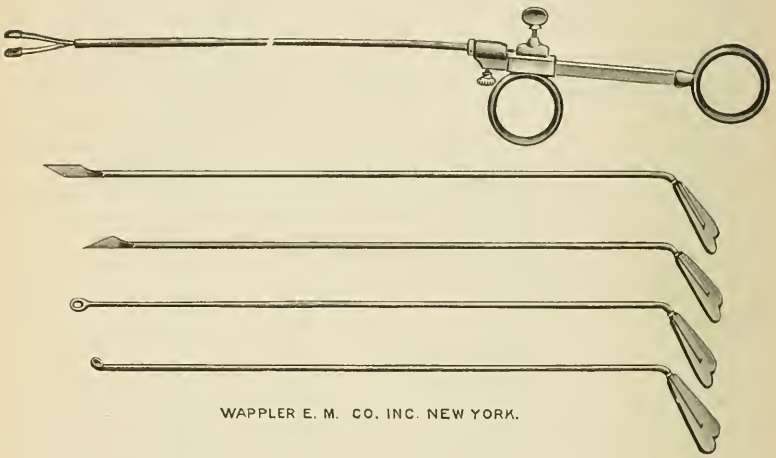


FIG. 33.—Instruments for operating endoscope.

of applicators, examining or operating instruments, and cannot be soiled and obscured by blood, secretions, or the lubricant. If air distention is required, an air-tight cap with magnifying lens is slipped over the proximal end of the collar and the urethra gently and carefully dilated by slowly compressing the little bulb, which forces air down the tube, where it can be retained by shutting off the stopcock. Water distention may also be used, if so desired. For simple

examination, treatment, or "fulguration," a magnifying lens is attached to the collar by a slender rod which allows of the use of applicators and any kind of instruments under direct visual inspection.

The method of using the instrument is as follows: The patient, having emptied his bladder, lies down on the operating table, his thighs supported by proper foot-rests or two ordinary stools. The largest tube that will enter the meatus with ease is then selected, cleansed, and lubricated and passed slowly and gently into the bulb of the urethra (in rare cases into the prostatic urethra), the obturator carefully withdrawn, and the light turned on; the urethral walls are then seen bulging into the lumen of the tube, which being slowly withdrawn, gives a clear and distinct picture of the entire canal from behind forward. As diseased areas are discovered they may be touched with concentrated solutions of silver nitrate or copper sulphate by means of wooden applicators wrapped with absorbent cotton, which has been dipped in the medicated solution. Polypoid and warty growths can be easily removed by means of a delicate snare used through the tube or by fulguration with the Oudin or d'Arsonval high-frequency spark.

WHEN IS GONORRHEA CURED?

Having considered the treatment of gonorrhea and its complications, the important question now arises: When is the disease cured, or at what time does the patient cease to be infectious? In order to answer these questions intelligently we must examine the patient's morning urine, passed in our presence, for several successive mornings, and if it is clear and contains neither pus nor gonorrheal shreds; *that is*,

if it be perfectly normal on repeated microscopic examinations, we know that the urethral lesions, at least, have been cured. If, on the other hand, there are shreds, which under the microscope are found to consist of pus and epithelial cells, whether they contain gonococci or not, we know that the urethral lesions are still uncured, and that the secretion may be infectious. If the shreds consist of epithelial cells alone, they, of course, in themselves, may not be dangerous; but even these patients must be warned not to have sexual relations, and advised to take a proper course of local treatment. In order to ascertain that there is no lurking trouble in the prostate gland, seminal vesicles, or ampullated ends of the vasa deferentia, as a result of posterior gonorrhea, the patient should pass all of his urine, and then have 8 to 10 ounces of warm, sterile water injected into his bladder. The prostate, vesicles, and vasa deferentia are then examined and massaged by a finger in the rectum. The material appearing at the meatus is received in a sterile glass graduate and kept for examination; the patient now passes the fluid in his bladder, which washes out any remaining secretion that has been expressed into the urethra; the sediment from this fluid and the material caught at the meatus are examined microscopically and cultures taken, and if the findings show disease, this must be treated as already described under urethritis, prostatitis, and seminal vesiculitis. The examiner must be familiar with the normal secretions of the prostate, vesicles, and ampullæ, so as not to err in his microscopic findings. One cannot be too guarded in giving an opinion on this subject, and should therefore make the above examinations in a most thorough, conscientious, and careful manner, and warn patients against matrimony or sexual relations until they are absolutely cured.

The follicles in the integument of the penis, between the two layers of the prepuce, and in the lips of the meatus, and also all of the glands that open into the anterior urethra should be carefully examined, in order to ascertain that they are free from the gonorrheal process. The presence of a positive fixation-test for the gonococcus in the absence of other symptoms, should also be considered proof that the disease is not cured, provided we bear in mind the fact that a positive test will often be obtained, even in cured cases, for two or three months after an acute gonorrhea.

CHAPTER VIII.

GONORRHEAL OPHTHALMIA.

Gonorrheal ophthalmia in the adult is caused by the accidental transference of gonorrheal pus from the genitals to the eyes by means of the fingers, dressings, or towels, and is therefore, strictly speaking, not a complication of gonorrhea, but rather an accidental infection.

In the newly born the infection occurs during parturition, from the gonorrheal pus in the mother's vaginal tract.

While the infection, in the adult, is comparatively rare, it is, unfortunately, by no means uncommon in young infants, in whom, under the name of ophthalmia neonatorum, it has been responsible for thousands of cases of so-called congenital blindness.

Symptoms usually appear within a few hours after infection and consist of redness and swelling of the conjunctiva, increased lachrymation, and a collection of mucus at the inner angle of the eye, accompanied by intense itching and a feeling as if foreign bodies were beneath the lids.

The conjunctivitis soon involves both of the lids, as well as the ocular mucous membrane, and is associated with a profuse purulent secretion, which flows out from between the intensely red and greatly swollen lids. The patient is at this time unable to open the eye, or eyes, voluntarily.

The foregoing manifestations are accompanied by intense pain in the eye-ball, forehead, and temple, with rapid pulse, rise of temperature, and general malaise.

The prognosis is always grave, and depends greatly upon the time the patient applies for treatment, whether one or both eyes are attacked, and also the extent and situation of the ulceration.

It is, at best, one of the most serious complications of gonorrhea, and as it may result in either partial or complete blindness, the prognosis must always be made in a most guarded and careful manner.

Treatment.—The treatment may be divided into prophylactic and curative.

Prophylaxis in the adult consists of scrupulous cleanliness, the avoidance of transferring pus to the eyes, and the immediate burning of all dressings which have been soiled by the secretions of the urethral tract.

In the newborn infant infection can be prevented, in 99 per cent. of the cases, by careful cleansing of the eyes and the instillation into each eye, as soon as the child is born, of two drops of a 2 per cent. solution of nitrate of silver, as first advocated by Credé.

Should infection occur, however, the patient, as soon as the first symptoms appear, is put to bed in a well-ventilated room and two competent nurses are employed, one for day and the other for night.

If only one eye is affected, the sound one is covered with a shield to prevent its infection; this shield is made of two pieces of rubber plaster, one four and the other four and one-half inches square, with their adhesive surfaces in contact, between which, in a hole made in the centre, a deeply concave watch-glass is fastened; through this glass the patient can see and the eye be inspected by the physician; the rubber plaster is fastened to the skin about the eye, and its edges sealed with collodion.

The nurses must be warned of the danger of infection, and told how to avoid it by keeping their hands and nails clean, and by wearing large, plain-glass spectacles to protect their eyes during the dressings and irrigations.

The eye must be washed out day and night with a 3 per cent. solution of cold boric acid (made with distilled water) as often as any secretion accumulates, and in the intervals between the washings the eye should be kept covered with cold cloths (absorbent gauze or sheet lint) taken from a block of ice, and changed every two or three minutes; these cloths must be burned as soon as removed, and never used again.

The eye is flushed out by means of an irrigator, held high enough to allow the cold boric acid solution to flow out in a gentle stream.

From the onset of the infection well up to the declining stage two drops of a 2 per cent. solution of nitrate of silver should be dropped into the eye once or twice in twenty-four hours, according to the severity of the inflammation; the silver nitrate solution being applied directly after a boric acid washing.

If the cornea becomes involved, instillations of a sulphate of atropin solution (gr. ij to ℥j) should be employed three times daily, and the nitrate of silver stopped.

Unless the attending physician is very familiar with diseases of the eye, he should send immediately for a competent ophthalmic surgeon, as faulty treatment will often result in the loss of either one or both eyes.

CHAPTER IX.

GONORRHEAL ARTHRITIS.

Gonorrheal rheumatism, or more correctly speaking, gonorrheal arthritis, is a common and always serious complication of gonorrheal infection. The disease occurs in both men and women, but is most frequently observed in the former; in some cases it accompanies every attack of specific urethritis, but in others only one.

While, in the majority of cases in both sexes, it follows gonorrheal invasion of the urethra, it may also complicate a gonorrheal ophthalmia, iritis, vulvovaginitis or gonococcic infection of other structures. This complication may occur at any time of life, from infancy to old age.

In men it usually occurs between the twentieth and fortieth years. The exciting cause of the disease is the gonococcus and its toxins, which gain access to the general circulation, and are thus carried to the joints from some local focus of gonorrheal infection.

In the acute cases, when the joint-effusion is serous or serofibrinous, the gonococcus can usually be found in the exudate of the affected articulation.

In the subacute and chronic cases, however, or when the exudate is seropurulent or purulent in character, the gonococcus is very rarely, if ever, found. In the purulent cases we are now dealing with a mixed infection, in which we find a large variety of organisms, among which may be mentioned

the staphylococcus, streptococcus, and occasionally the colon bacillus. A single negative examination, however, is not sufficient to settle the diagnosis, as a second or later one may reveal the presence of the gonococcus.

It is very difficult to state, definitely, how often gonorrheal arthritis complicates gonorrheal infection.

The figures given by different investigators vary between 1 and 10 per cent.

It should never be forgotten that the diagnosis of gonorrheal rheumatism is frequently overlooked, many cases being recorded as chronic rheumatism, rheumatoid arthritis, arthritis deformans, rheumatic gout, etc., so that the proportion is probably much higher than it would at first appear to be.

The examination of any given case of arthritis therefore should never be considered complete without a careful investigation of the patient's history for previous gonococcic infections and a thorough search for the presence of urethritis, vesiculitis, prostatitis, salpingitis, or vulvovaginitis.

In males the gonococci usually enter the circulation from the deep urethra, prostate, and seminal vesicles.

It is extremely doubtful whether infection of the joints ever complicates a purely anterior urethritis.

In women the articular involvement usually follows a gonorrheal endometritis or salpingitis.

Trauma and previous rheumatic or gouty affections of the joints are predisposing causes.

Under trauma we must include not only direct injury to the articulations, but also rough or unskilful treatment of the urethral tract, such as irrigation of the urethra and bladder by hydrostatic pressure, after the example of Janet, or by the large hand-syringe, whereby fluid is forced

through the compressor muscle into the deep urethra and bladder.

The passage of sounds, urethroscopes or rigid instruments in the acute stage of the disease, and the use of unnecessarily strong and irritating injections must also be included under this heading, as any of these procedures may cause the gonorrheal process to pass rapidly into the deep urethra, prostate, and seminal vesicles.

The invasion of the joints is most likely to occur during the first few weeks of an acute urethritis, but it may take place at any time and in any stage of the disease.

None of the articulations are exempt from attack, but certain of them appear to be more liable to infection than others.

In order of frequency those most often involved are the knee-, wrist-, ankle-, finger- and toe-joints, elbows, hips, shoulders, temporomaxillary, and sternoclavicular articulations.

It is worthy of note that temporomaxillary arthritis is much more frequently gonorrheal than not, and that its occurrence should always lead us to suspect a Neisserian infection.

The number of joints involved at one time is usually two or three, but infection of more than this number is not infrequently observed, especially when the smaller articulations, such as those of the fingers and toes, are affected.

The onset of the disease may be either gradual and mild or sudden and acute.

In the former type the objective symptoms are few at first; the patient usually complains of pain in one or more joints, which is at its worst in the morning, on arising,

and accompanied by more or less stiffness of the affected articulations.

As the patient moves about the pain and stiffness diminish, and later in the day may even disappear completely, not to return until the next morning.

The pain may be sharp, and shift from one joint to another, or it may be dull and stationary.

In many cases only one joint at a time will give symptoms, but it is also common for several to be involved at once.

While at first there is little, if any, change in the external aspect of the part, sooner or later, if the process goes on unchecked, external evidences of inflammation begin to appear; there is more or less effusion into the joint cavity, redness, heat and periarticular swelling and tenderness.

Fever is rarely a prominent symptom in these cases, unless an exacerbation occurs, when the picture changes to that of the second or acute variety.

In this type, which may appear suddenly without warning, or which has been preceded by some of the symptoms described above, there is a severe, acute arthritis, appearing suddenly, with extreme pain and a temperature which may reach 102° to 103° F., or more.

The joints involved are exceedingly painful, hot, and swollen, and their function is completely lost.

The skin is red and tender, and there is a marked and rapidly increasing effusion into the articular cavity.

This type, which in many of its aspects closely resembles acute rheumatic fever, rarely resolves completely, in the manner so characteristic of the latter disease, and exhibits also, as does the variety first described, a marked tendency to result in more or less fibrous ankylosis of the implicated joint or joints.

The fluid obtained by aspiration is usually serous and contains gonococci.

Rarely it may become seropurulent or purulent, but this is usually a sign of the occurrence of a mixed infection, (staphylococcus, streptococcus, etc.).

Whether the onset of the disease belongs to the first or to the second of the types above described, a common and distressing result is the appearance of a stubborn, persistent hydrarthrosis, lasting in many cases for weeks or even months.

The knee is the articulation most likely to be thus implicated.

Occasionally both knees are affected, but unilateral involvement is more frequent.

The condition is characteristically stationary and resistant, as compared to acute rheumatism, where the inflammation shifts from joint to joint.

In those cases in which the gonococci attack the smaller articulations the condition often closely resembles a polyarthritis deformans. The joints of the carpus and tarsus and those of the fingers and toes are the ones most commonly involved, especially the interphalangeal articulations, in which case the inflammation often results in the formation of the typical "radish finger" of the French authors.

Atrophy of the muscles in relation to the affected joints is common, with an accompanying falling of the arches, when the feet are involved.

The diagnosis is to be made on the existence of an uncured gonorrhea, and the finding of gonococci in the secretions from the urethra, prostate or vesicles; the small number of joints involved, the chronicity of the disease with evanescent exacerbations, the extreme tendency to ankylosis,

the presence of a positive complement-fixation test for the gonococcus, and the characteristic resistance to the usual antirheumatic remedies.

In passing, it is well to mention, as frequent accompaniments of gonorrheal arthritis, tenosynovitis, myositis, especially of the muscles of the neck, back and forearm, and bursitis, most often affecting the bursæ about the tendo Achilles and os calcis.

Isolated patches of periostitis, especially of the os calcis and vertebræ, are also occasionally observed.

In considering the treatment of gonorrheal rheumatism it must never be forgotten that no amount of local joint treatment will of itself be of any avail unless we attack, coincidentally, the local foci of infection whence fresh supplies of gonococci are continually fed into the general circulation.

It is therefore imperative that the urethral tract and the glandular structures in anatomical relation with it should be carefully examined, and that urethritis, para-, and periurethritis, cowperitis, prostatitis or seminal vesiculitis, should receive appropriate local treatment, with irrigations, instillations, prostatic and vesicular massage, hot rectal irrigations of normal saline solution, and variously medicated rectal suppositories; also local applications through the endoscopic tube, and the prompt liberation of any pus formation in the periurethral glandular structures, prostate, or seminal vesicles.

Strictures of the urethra must be dealt with either by gradual dilatation, or by internal or external urethrotomy, depending upon their consistence and situation in the canal.

The urine should be rendered antiseptic by the use of urotropin in full dosage, and the patient instructed to drink freely of bland still waters, and to avoid alcoholic

beverages and all articles of diet that cause urinary concentration or irritation.

The local treatment of the joints depends entirely upon the stage of the disease in which the patient is seen.

During the acute period the affected joints should be put completely at rest.

The patient should be kept as quiet as possible, or put to bed, and the inflamed joints immobilized by appropriate splints; the use of cold wet dressings of aluminum acetate, bichloride of mercury, or a solution of lead subacetate, in conjunction with an ice-bag, is indicated for the relief of pain and swelling. Internal medication with the salicylates, aspirin, pyramidon, etc., is sometimes useful in alleviating the pain, but these drugs have absolutely no specific action whatsoever.

When the process has reached the subacute or chronic stage it is time to begin the use of measures designed to restore the mobility of the joint and to prevent the formation of adhesions.

Massage, passive and active movements, the use of superheated dry air, baking the part at a temperature of 250° to 350° F., the therapeutic incandescent lamp, and the Oudin high-frequency electric current are all very useful at this time.

Some benefit may also be derived from local applications of ichthyol, methyl salicylate, or compound iodin ointments, and a firm pressure bandage.

Of utmost importance in this stage of the disease is the use of gonococcic vaccines and sera.

These should be autogenous whenever possible, but very satisfactory results can also be obtained from the use of the usual stock preparations.

The dosage should begin with about 25,000,000 organisms, and the injections be repeated, with constantly increasing doses, every three to six days, according to the reaction and the results obtained.

Antigonococcus serum has not yielded as good results, in my hands, as vaccine, but it is occasionally very beneficial, and should therefore not be forgotten.

The large number of cases of gonorrhea in which the seminal vesicles have apparently acted as the local foci of infection has led Fuller and others to resort to perineal incision and drainage of these structures.

Some very brilliant results have been reported following this procedure but the operation should never be advised until the above methods of treatment have been given a fair and sufficient trial, as the exposure and drainage of the vesicles is, at best, an operation of some magnitude.

The use of Bier's hyperemia is sometimes of service in chronic and subacute cases, but in the author's experience it has proved of doubtful value.

Occasionally in rebellious cases of hydrarthrosis which have resisted strapping and the other measures described above, it may be necessary to resort to aspiration of the joint under the most rigid aseptic precautions.

In the rare cases in which the arthritis goes on to suppuration, immediate arthrotomy and drainage is imperative, but the prompt and intelligent application of the methods of treatment outlined above will, as a rule, render the adoption of this measure unnecessary.

CHAPTER X.

STRICTURE OF THE URETHRA.

In order that the reader may clearly understand what stricture is, and how to detect and treat it properly, it is necessary at this point to devote a few lines to the anatomy, length, shape, and so-called "caliber" of the urethra.

The male urethra is a collapsed canal or a continuous closed valve, whose surfaces or walls are always in contact, except during urination, ejaculation, and the passage of instruments. It extends from the meatus urinarius externus to the bladder, which it joins at a right angle.

It is made up of three layers, an internal or mucous layer, a middle or submucous connective-tissue layer, and an external or muscular layer, which in turn consists of circular and longitudinal fibers running from the bladder to the meatus, the circular or ring-shaped fibers being situated outside of the longitudinal ones. In overdistention of the canal with examining instruments the circular fibers may be, and have been, frequently mistaken for true stricture, and the patient subjected to much harmful and unnecessary treatment.

The mucous membrane of the urethra is shining in appearance, yellowish-pink in color, arranged in longitudinal and small transverse folds, and covered with flat pavement-epithelium for about the first quarter of an inch to one inch of its length, beyond which it is of the columnar variety as far as the bladder.

The portion of the canal which is contained in the corpus spongiosum extends from the meatus urinarius externus to the penoscrotal junction, where it joins the bulbous portion; it is known as the penile or pendulous urethra. On the roof or upper surface of the penile urethra, about one-half to three-quarters of an inch from the meatus, is the lacuna magna, into the orifice of which, although bounded by valve-like reduplications of the mucous membrane, the tips of whalebone filiform bougies are apt to pass during urethral examinations.

Situated principally in the roof or upper surface, but also in the floor or lower surface of the canal for about the first three or four inches of its length, are the mucous follicles or glands of the urethra, with their orifices opening directly toward the meatus; these, if dilated, may also engage the tips of small examining instruments.

The bulbous portion of the canal extends from the penoscrotal junction to the anterior layer of the triangular ligament, and is surrounded by the erectile tissue of the bulb of the corpus spongiosum and the accelerator urinæ muscle.

Opening directly on its floor are the two orifices of Cowper's ducts, the *glands* themselves being situated between the anterior and posterior layers of the triangular ligament, and in the substance of the compressor urethræ muscle.

We next come to the membranous or fixed portion of the canal, which is surrounded by the compressor urethræ muscle and limited in extent by the anterior and posterior layers of the triangular ligament.

The prostatic portion, situated as it is in the prostate gland, and extending from its apex to its base, presents the following structures upon its floor: Running longitudinally in the median line is the verumontanum or caput gallinaginis,

containing on its summit the orifice of the uterus masculinus, on each side of which is the *opening* of the common ejaculatory duct. The prostatic ducts open into the prostatic sinuses, which are situated on each side of the verumontanum. It will therefore be seen that the seminal vesicles, testicles, and prostate gland are in direct communication with this portion of the urethra by means of their ducts.

The total length of the urethra varies in different individuals and under different conditions, the average being from about seven to eight and one-half inches (17.5 to 21.5 cm.); this is somewhat increased in hypertrophy of the prostate gland.

The penile and bulbous portions together measure about six and one-half ($6\frac{1}{2}$) inches (16.5 cm.); the membranous about three-quarters ($\frac{3}{4}$) of an inch (2 cm.); and the prostatic portion one and one-quarter ($1\frac{1}{4}$) inches (3.25 cm.).

Being a collapsed canal, and in no sense of the term a tube, the urethra has, strictly speaking, no caliber, but merely a degree of dilatability which varies greatly in different individuals and in different portions of the same urethra, there being certain points of physiological contraction and dilatation, which points are well shown in Fig. 34, which was drawn from a plaster cast of the normal urethra.

Therefore, in examining a patient for stricture of the urethra, the surgeon must bear in mind the fact that the meatus urinarius, the middle of the pendulous portion, and the membranous portion are normally narrower than the rest of the urethra, and also that the fossa navicularis, the bulb, and the middle of the prostatic portion are larger and more dilatable; and that if the urethra is overdistended with examining instruments, these physiological contractions are very liable to be mistaken for strictured areas.

The shape of the urethra varies greatly in the different regions of the canal, being vertical at the meatus and throughout the fossa navicularis, transverse in the penile or pendulous urethra, and like an inverted Y in the middle of the prostatic portion, thus Λ; this formation is due to the jutting up of the verumontanum from the floor of the prostatic urethra.

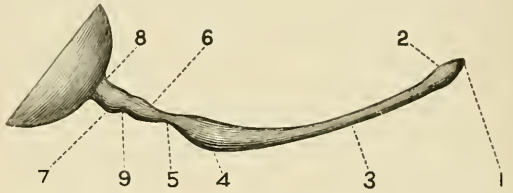


Fig. 34.—Showing points of contraction and dilatation in a normal urethra. (Thompson.)

1. Meatus urinarius	21 to 28	French.
2. Fossa navicularis	30 to 33	"
3. Middle of pendulous portion	27 to 30	"
4. Bulbous portion	33 to 36	"
5. Membranous portion	27	"
6. Apex of prostatic portion	30	"
7. Middle of prostatic portion	45	"
8. Base of prostatic portion	33	"
9. Indentation caused by verumontanum.		

Etiology of Stricture.—The vast majority of cases of urethral stricture are due to gonorrheal urethritis.

Traumatism is the etiological factor in a small percentage of cases.

Congenital stricture is occasionally, though quite rarely, encountered.

Traumatic stricture is usually single, and may occur in any portion of the urethra, depending on the seat of injury. In the pendulous urethra it usually follows injury of this portion of the penis from various causes. In the vast

majority of cases it is found in the bulbous or membranous portions or at the bulbomembranous junction; in these regions it follows falls, kicks or blows upon the perineum, causing partial or complete rupture of the urethra, either with or without fracture of the pelvis. It may also result from caustic injections into the urethra, in which case the region of the fossa navicularis is the most usual site of the constriction.

At the time of the injury these patients have more or less difficulty in urination, or even complete retention of urine, with extravasation of blood and urine into the surrounding

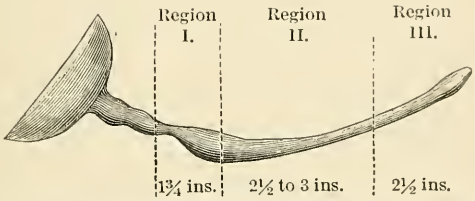


Fig. 35.—Showing division of urethra into regions. (Thompson.)

tissues. Bleeding from the meatus may be either scanty or free, depending upon the severity and extent of the urethral traumatism.

For a description of urinary extravasation and its treatment the reader is referred to page 132.

Congenital stricture is occasionally observed. It may occur in any portion of the urethra, but especially at the meatus, or just beyond it in the fossa navicularis.

For conciseness and clearness of description in regard to the location or seat of gonorrheal stricture we will follow the plan of Sir Heury Thompson, who divides the urethra into three regions as follows (Fig. 35):

Region I includes all of the membranous, and one inch of the bulbous urethra, and is therefore about one and three-quarters ($1\frac{3}{4}$) inches in length.

Region II extends from the anterior limit of Region I, to within two and a half ($2\frac{1}{2}$) inches of the meatus, its length varying from two and a half to three ($2\frac{1}{2}$ to 3) inches.

Region III includes the first two and a half ($2\frac{1}{2}$) inches of the canal from the meatus.

Thompson found that the vast majority of gonorrheal strictures were located in the bulbous urethra, and at the bulbomembranous junction, or Region I; next in the region of the fossa navicularis, or Region III; and least frequently in the middle of the pendulous urethra, or Region II.

Primary gonorrheal stricture of the prostatic urethra has never been found, the changes in this portion of the canal being due to submucous cell-infiltration, which does not go on to true stricture-formation.

The reason for the so frequent occurrence of gonorrheal stricture in the bulb of the urethra and fossa navicularis is the fact that in these regions the mucous membrane is lax and surrounded by a large amount of erectile and vascular tissue, an arrangement that tends to prolong a gonorrheal inflammation which has settled there, which naturally results in more or less cicatricial contraction.

In the majority of cases gonorrheal stricture is single, although sometimes there may be two, three, or even four well-marked contractions in the same case.

This, however, is not at all common, and when found is in all probability due to a continuation of the same pathological process, either from the bulb forward, or *vice versa*, and constitutes what is known as a tortuous stricture, which may involve the canal for an inch or so; or even for its entire

length, thus converting it into a thickened tube with irregularly contracted lumen.

Gonorrheal stricture, as a rule, comes on slowly, and in the majority of cases does not give rise to marked or urgent symptoms until several years after the initial attack of gonorrhea. This is shown by the fact that the great majority of men apply for treatment between their twenty-fifth and fortieth years.

There are some exceptional cases, however, in which symptoms are observed as early as the first year after the acute urethral inflammation; which goes to show that stricture-formation is in some cases very rapid indeed, and that the physician should always accurately ascertain the condition of the urethral mucous membrane before beginning any form of local treatment.

Pathology of Stricture.—As a result of the gonorrheal process there is a small, round-cell infiltration into the submucous connective-tissue layer, which constitutes the essential lesion of stricture. This infiltration is soft and yielding at first, and if sufficient in amount to cause any loss of urethral caliber is called "soft" stricture.

As the process advances, however, the small round cells are replaced by connective-tissue cells, and we then have a fully formed "semifibrous" structure, which in time becomes innodular and densely fibrous and causes more or less impairment of the urethral lumen, with loss of dilatability (Figs. 36, 37, and 38).

These cell-changes may be sharply limited to the submucous connective-tissue layer or involve the corpus spongiosum to a greater or less degree, giving rise to a periurethritis.

The mucous membrane over the stricture becomes more or

less thickened and loses its smooth and shining appearance, owing to a chronic catarrhal inflammation.

From the above it will be clearly seen that all gonorrheal strictures are soft and yielding at first, and can there-

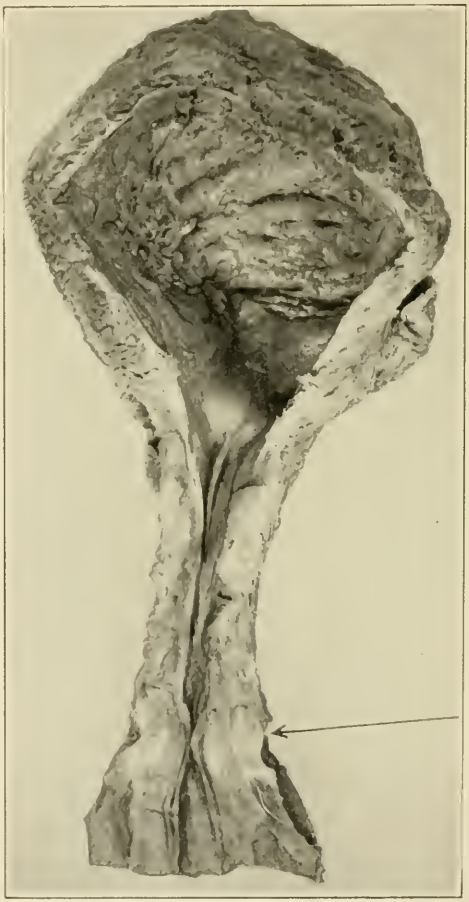


FIG. 36.—Stricture of the bulbous portion of urethra. (College of Physicians and Surgeons.)

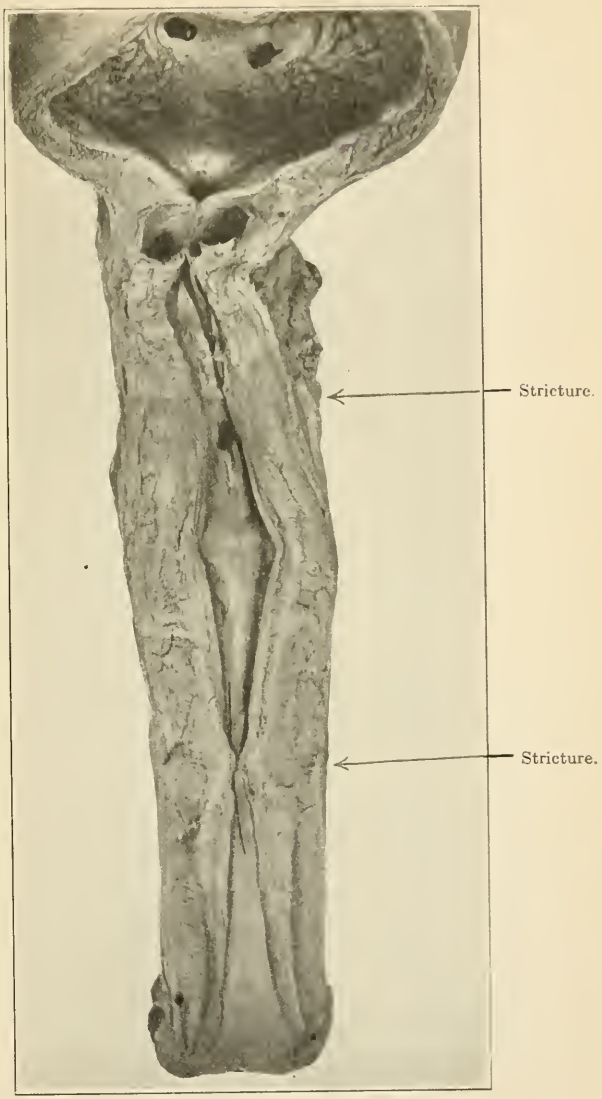


FIG. 37.—Strictures of urethra; one at the bulbomembranous junction and one in the pendulous portion. (College of Physicians and Surgeons.)

Fig. 38.—Stricture of the bulbomembranous junction. Note hypertrophy of the bladder walls and contraction of the bladder. (College of Physicians and Surgeons.)

fore be readily cured by gradual dilatation and local urethral medication during that stage. When they have become densely fibrous and hard, however, we are obliged to resort to some of the various operative measures described in Chapter XIV.

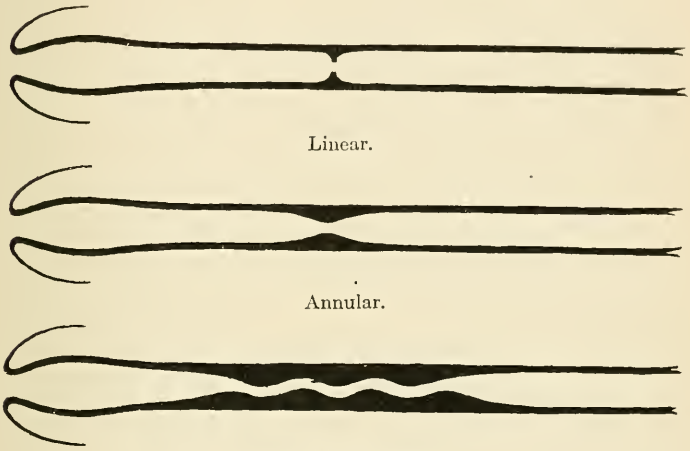


Fig. 39.—Urethral strictures.

Forms of Stricture.—A linear stricture consists of one or more thread-like bands situated just beneath the mucous membrane and encircling the urethra to a greater or less degree.

An annular stricture consists of a broader ring of stenosis than the linear variety. If the narrowing involves an inch or more of the canal, we then speak of it as an irregular or tortuous stricture (Fig. 39).

The position of the opening in any of these forms of stricture may be either central or excentric.

The so-called spasmodic stricture is due to the contraction of the compressor urethræ muscle, or to the circular muscular fibers of the urethra, and being merely a temporary condition of muscular spasm, must not be looked upon as a true stricture, which is always due to pathological changes in the canal.

It occurs most frequently in nervous subjects. The spasm may be caused by the rapid or unskilful passage of urethral instruments, operations on, or diseases of, the external genitals, rectum and anus, highly acid urine, the long retention of urine; or, in some cases, from a feeling of shame or fear, as when patients are unable to pass their urine before a class or even in the presence of the examining surgeon. It may also result from faulty urethral treatment, especially the Janet method, and sometimes complicates affections of the bulb and deep urethra, and also of the prostate gland and adjacent structures.

The condition is also found as a complication of typhoid fever, transverse myelitis, tabes and other affections of the spinal cord, and after operations in the abdominal cavity and for inguinal hernia.

CHAPTER XI.

SYMPTOMS OF STRICTURE.

The symptoms of stricture vary greatly in different cases, their severity depending both upon the degree of contraction and also the extent of the strictured area.

As a general rule, there is more or less serous or sero-purulent discharge from the meatus, which may even amount to a drop or so in the morning, or only to a gluing together of the meatus; in other cases, however, there is no discharge.

If the morning urine is examined, it will be found to contain shreds and flakes floating about in a clear or turbid urine.

The meatus is often quite blue in color from congestion caused by the cicatricial tissue around the urethral walls, which interferes more or less with the return circulation.

As the stricture contracts there is more or less dilatation of the urethra behind it, caused by the damming back of the stream at each act of urination; this mechanical irritation in time causes congestion and inflammation of the urethral mucous membrane from the posterior surface of the stricture up to and, in some cases, into the bladder, so that these patients really have posterior urethritis, with more or less prostatitis and urethrocystitis, which gives rise to an increased frequency in urination, which may be preceded, accompanied,

or followed by a varying amount of pain and uneasiness in the urethra, perineum, prostate, and testes.

As the stricture contracts, the muscular walls of the bladder may hypertrophy from the extra amount of pressure they are compelled to exert in order to empty that viscus through the stenosed canal. The urine now comes with less force, and cannot be thrown any distance from the meatus; in severe and neglected cases it comes in scalding, blood-stained drops, which can only be expelled by severe and long-continued straining; which in time may cause either hernia, hemorrhoids, or prolapse of the rectum, and be associated with evacuation of the bowel at each attempt at urination.

As a result of the inflammation in the prostatic urethra and sometimes in the gland itself, these patients may have either painful erections or nocturnal pollutions, or, if the inflammatory process involves the ejaculatory ducts, epididymitis, epididymo-orchitis, or seminal vesiculitis.

Some cases at this time have a constant dribbling of urine from the meatus, this incontinence being due to a loss of contractile power of the vesical sphincters.

Retention of urine may occur at any time during the course of stricture-formation; in some cases it is the first symptom that calls the patient's attention to his real condition; it is due to a sudden swelling of the mucous membrane covering the stricture, caused by irritating urine, overzealous instrumentation, catching cold, sexual or alcoholic excesses, etc., some patients being more prone to this complication than others.

If cystitis is well marked, patients complain of constant and deep-seated pain over the bladder.

The urine in some of these advanced and neglected cases

becomes ammoniacal in reaction, bloody, and loaded with crystals and pus, which latter, being coagulated in the bladder by the ammonia, causes a ropy and gelatinous condition of the urine, which is liable to obstruct the eye of the instrument during catheterization. If the above condition of the urine is not modified by proper treatment it may result in stone-formation.

CHAPTER XII.

COMPLICATIONS OF STRICTURE.

That portion of the urethra situated behind the stricture, as already stated, becomes dilated to a greater or less extent, and its mucous membrane and connective-tissue layer become

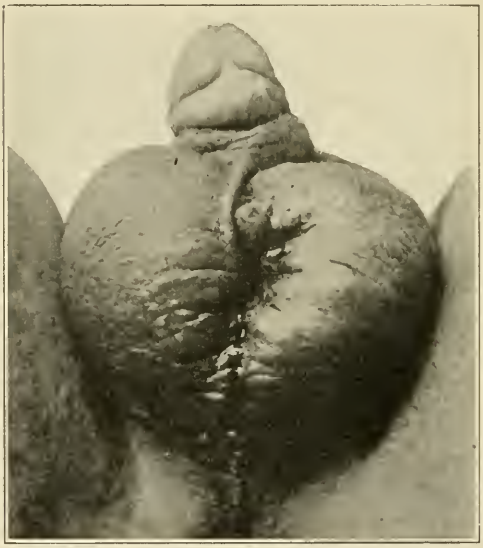


Fig. 40.—Urethroscrotal fistulæ complicating tight stricture of the bulbous urethra. (Author's case.)

much thickened; the orifices of the prostatic sinuses and the ejaculatory ducts which are situated in the floor of the prostatic urethra are also dilated; these changes are all

produced by the back pressure of the urine, whose free outward passage is prevented by the stenosed and thickened canal.

ABSCESSES AND FISTULÆ.

Abscesses and fistulæ may form behind the stricture, originating in inflamed urethral follicles or ulcerated spots into which the urine escapes, and finally burrows in fistulous tracts, which may open in the perineum, on the buttocks, the scrotum, or the abdomen (Fig. 40).

In some severe cases abscesses of Cowper's glands or of the prostate occur, which, if untreated, may rupture either into the urethra, bladder, peritoneal cavity, perineum, or rectum.

FIG. 41.—Cystoscopic photograph of diverticulum of bladder. (Author's case.)

DIVERTICULA OF BLADDER.

The bladder walls become greatly thickened from hypertrophy of the muscular layer, which causes trabeculæ of muscular tissue to project into the viscus; between these ridges the bladder wall may become very thin and dilated, going on to the formation of sacculi and diverticula (Fig. 41), which may in time rupture and allow the contents of the

bladder to escape into the peritoneal cavity. Vesical calculi may also be found lying in these diverticula or embedded in the recesses between the trabeculæ.

URETERS.

Following these changes in the bladder, the ureters become dilated, as do the pelves of the kidneys, the secreting portions being pushed out and compressed by the accumulated urine. The inflammation ascending from the bladder through the ureters finally enters the pelves of the kidneys, causing pyelitis or pyelonephritis on one or both sides, with all of their concomitant symptoms.

EXTRAVASATION OF URINE.

The urethra behind the stricture having become thin and weakened may, as the result of violent straining, or without any apparent cause, give way and allow the urine to escape into the surrounding tissues in greater or less amount. Extravasation of urine also occurs in partial or complete rupture of the urethra from falls, blows and kicks on the perineum, either with or without fracture of the pelvis. The urethra may give way or be ruptured in any of the following regions, depending, of course, upon the site of the stricture or the point of injury:

1. Between the meatus and the penoscrotal junction.
2. Between the penoscrotal junction and the anterior layer of the triangular ligament.
3. In the membranous urethra; that is, between the anterior and posterior layers of the triangular ligament.
4. Behind the posterior layer of the triangular ligament.

It is, of course, possible and not uncommon for two of these regions to be included by the rupture of the urethral wall at the same time.

The constitutional symptoms of extravasation are as follows: The patient sometimes experiences a sudden sensation, as if something had given way in some part of the urethra; this is followed by a feeling of momentary relief, speedily accompanied by swelling of the penis, hypogastrium, scrotum, or perineum, according to the locality of the rupture. The patient at this time has fever, with chilly sensations or well-marked chills and a feeling of general malaise, and if not radically and speedily treated by operation, passes into a condition of extreme shock, and finally dies of a general septicemia.

The skin over the swelling, which at first is very tense, bright red in color, and shining in appearance, soon becomes gangrenous, sloughing, and emphysematous from the presence of the gases situated beneath it, which are produced by the purulent, decomposing, and sometimes ammoniacal urine extravasated through the tissues (Figs. 42, 43, 44, and 45).

It is an established fact that normal (sterile) urine does not cause gangrene or destruction of the tissues even when injected beneath the integument in considerable quantities.

The situation of the swelling varies according to the point of rupture and the time that has elapsed since the injury or accident.

When the opening in the urethra occurs between the meatus and the penoscrotal junction the extravasation takes place into the tissues of the corpus spongiosum, pushing forward into the glans penis and causing great swelling of that organ.

When the rupture occurs between the penoscrotal junction

FIG. 42.—Extravasation of urine into penis, scrotum, and right buttock. (Author's case.)

FIG. 43.—Extravasation of urine into scrotum. (Author's case.)

FIG. 44.—Extravasation of urine into scrotum and over symphysis. (Author's case.)

FIG. 45.—Extravasation of urine, with gangrene and sloughing of scrotum. (Author's case.)

and the anterior layer of the triangular ligament the urine is extravasated into the scrotal tissues and upward on the hypogastrium, sometimes as far as the umbilicus.

When the rupture takes place between the anterior and posterior layers of the triangular ligament (in the membranous urethra) the urine is at first confined between these layers, but soon makes its way backward into the pelvic cavity, or, in exceptional cases, burrows forward into the perineum.

When rupture takes place behind the posterior layer of the triangular ligament the urine passes either into the recto-vesical space, and thus works down to the perineum, or passes upward into the pelvic tissues and in front of the bladder.

Treatment.—No matter how great or small the amount of extravasated urine is, we must always bear in mind the fact that there is a constant leakage of septic urine through a more or less damaged urethra; and that in order to check it the bladder must be promptly drained through the perineum, and the stricture cut. This must be done without delay, as the longer it is put off, the greater the extravasation becomes, and this, if left uncontrolled, means abscess-formation, or sloughing and gangrene of the soft parts, and finally death from absorption of septic material.

The patient, having been anesthetized, is put in the lithotomy position, and the parts shaved and rendered surgically clean in the usual manner.

External urethrotomy, or external and internal urethrotomy combined, or perineal section, is then performed, according to the manner described under perineal operations for bladder drainage and stricture of the urethra, to which the reader is referred (p. 165). All of the stricture tissue having been

thoroughly divided and a full-sized sound passed, a large perineal tube is inserted into the bladder and secured in the usual manner.

By free and deep incisions all of the extravasated urine must be liberated, the sloughy and gangrenous tissues removed, and bleeding-points controlled. The incisions are thoroughly irrigated with peroxide of hydrogen, followed by hot saline solution, and lightly packed with moist, sterile gauze.

The incisions are kept scrupulously clean by frequent irrigation and dressing, and treated on general surgical principles.

If urinary abscesses or fistulæ exist, they must be freely opened and scraped, or resected and drained at the time of the perineal operation, if the patient's condition warrants it, otherwise they may be left, and attended to at a later date.

For the condition of shock, which usually complicates these cases, we should employ subcutaneous, intravenous, or rectal injections of normal saline solution, both before, during, and if necessary, after the operation.

CHAPTER XIII.

DIAGNOSIS OF STRICTURE.

In order to ascertain the presence of stricture, its situation, consistency, and caliber, the following instruments are necessary:

Filiform and olivary pointed bougies, bougies à boule, or acorn-pointed bougies, steel sounds, a scale plate and measure combined, and for certain selected cases, a urethrometer.

The scale plate, as well as all of the urethral instruments, should be made and marked according to the French scale, which runs as follows:

No. 1 French = $\frac{1}{3}$ of a millimeter in diameter.

No. 2 French = $\frac{2}{3}$ of a millimeter in diameter.

No. 3 French = 1 millimeter in diameter.

Thus it will be seen that each instrument increases in size by one-third of a millimeter in its diameter.

The American and English scales, which are far inferior to the French, are very irregular and little used at the present time and therefore will not be described.

Scale plate: The scale plate or gauge (Fig. 46) is made of nickel-plated steel, with numbers or sizes running from No. 1 to No. 35 French, inclusive, although it is rarely necessary to use an instrument larger than a No. 30 or 32 F. One edge is marked in inches, like a rule, so that it can be used for measuring the distance from the meatus at which instruments are stopped by the stricture.

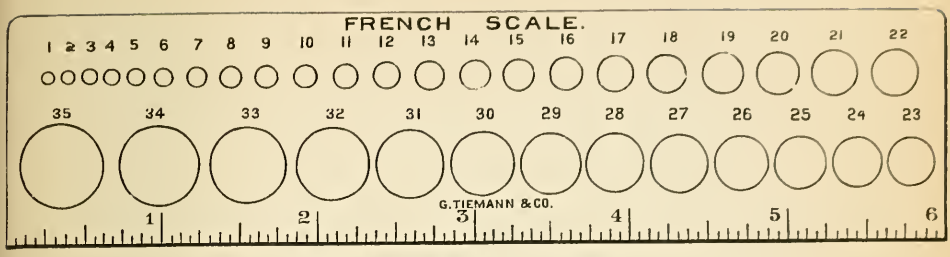


Fig. 46.—Scale plate and measure.

Fig. 47.—Author's sound.

Fig. 48.—Olivary bougie.

Sounds: Sounds are made of smooth, highly polished nickel-plated steel, and should run from No. 18 to No. 32 or

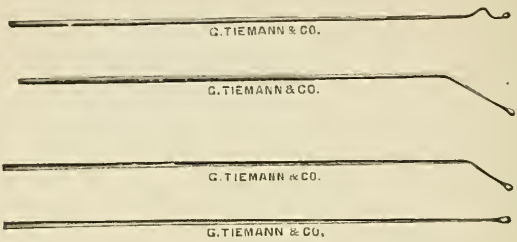


Fig. 49.—Whalebone filiform bougies.

even No. 35 French, inclusive. They should have a gentle and easy curve and a conical point, which is three sizes smaller than the shaft (Fig. 47).

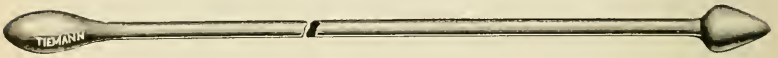


Fig. 50.—Silk bougie à boule.

Olivary Bougies: The French olivary bougies are the best. They are black or yellow in color, with a very smooth and highly polished finish. (See Fig. 48.)

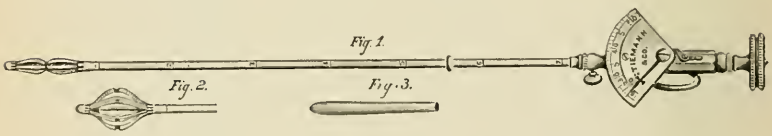


Fig. 51.—Otis urethrometer.

The shaft tapers gradually into the neck, which terminates in the olivary end, this being about seven sizes smaller than

the shaft. These bougies must be flexible, so as to adapt themselves to the curves of the urethra, and should run from No. 3 to No. 18 or No. 20 French, inclusive.

Filiform Bougies: Whalebone filiform bougies are the best (Fig. 49). They are twelve inches in length and are about No. 1 to 3 of the French scale in size; the shaft must be smooth and highly polished, and terminate in a tiny bulb. The points of some of the instruments may be turned and twisted in various ways, in order to facilitate their entrance into irregular strictures. The remainder, however, should be made straight, and in my hands are really the most useful for cases of tight stricture. The surgeon should have a dozen at least.

Bougies à boule: These instruments should be soft and flexible, as is well shown in Fig. 50. Those made of metal cause more pain, and do not give the examiner as good an idea of the condition of the urethral walls, and should not, therefore, be employed. The shoulder of the bulb should be well marked and smooth. It is best to have a set of these bougies from No. 8 to No. 32 French, inclusive.

The Urethrometer: The Otis urethrometer, if employed intelligently and conservatively, is a useful instrument for detecting and locating strictures in a patient with an abnormally small meatus (16 to 18 French). If, however, the little bulb is screwed up too high and then withdrawn, there is great danger of mistaking the physiological contractions and circular muscular fibers of the urethra for true strictures.

The instrument (Fig. 51) consists of a No. 8 French straight cannula, terminating in a bulb made up of short arms, which can be dilated (1) and contracted (2) by means of a rod running through the cannula and terminating in a screw at the handle of the instrument. A thin rubber shield

(3) is drawn over the metallic bulb to protect the urethra from injury. The index on the handle shows the size in millimeters to which the bulb has been dilated or contracted. The bulb when closed is about No. 16 to No. 18 French, but can (although it never should) be expanded up to No. 40 or 45 of that scale by turning the screw at the handle, which indicates at the same time the increase in size on the index.

Being a straight instrument, it can only be employed for examining the anterior urethra.

Before exploring the urethra with instruments we should always ascertain the date of the gonorrheal infection as well as its duration, severity, and complications, as these points will throw much light on the patient's present condition. If there is a mucopurulent or purulent urethral discharge, with swelling and redness of the meatus, the patient must be put on appropriate treatment, and instrumentation deferred, unless imperative, until all of the acute inflammatory symptoms have subsided. Inquire into the frequency of urination during the day or night; if it is painful or causes uneasiness in the region of the prostate; also, if there is any morning discharge or sticking of the lips of the meatus. Ascertain if ejaculation is premature or painful, or if nocturnal pollutions are too frequent or painful, or the ejaculate bloody. Ask if there is a dribbling of urine after urination, or any change in the character, force, or size of the stream. If anything in the patient's history points to disease in the prostate or seminal vesicles, these structures must be palpated by a finger in the rectum, and their expressed secretions collected at the meatus, or taken from the urine and examined microscopically. Have the patient pass his urine in a glass cylinder at the time of his visit; this is carefully examined for gonorrheal shreds, pus, mucus, albumin and

casts, as these elements, by their presence in the urine, together with a history of the case, will give a clear idea as to the extent and severity of the urethral and even bladder inflammation.

The following rules should be carefully carried out in making all urethral examinations or explorations, no matter what kind of instruments are to be employed: The patient should be put upon urotropin, in full doses, for at least twenty-four hours before and after instrumentation, and should be instructed to drink large amounts of water. Reasonably large, well-lubricated, warm and sterile instruments should always be used first, as small and cold ones are more apt to irritate the urethra, and thus cause spasm, which interferes greatly with further examination. If instrumentation causes marked bleeding or much pain, it should be stopped immediately, and not be repeated for a day or so, appropriate treatment being employed in the meantime.

The patient having urinated in order to wash out any secretion that may have collected in the urethra, lies down on an operating table, with head and shoulders slightly elevated on a pillow or cushion; in this way relaxing the abdominal and perineal muscles, and the suspensory ligament, which latter runs from the symphysis pubis to the dorsum of the penis. The clothing should be drawn down as far as the knees and up to the umbilicus, as by so doing the instrument can be readily depressed between the thighs as it enters the bladder, and at the same time we can note the median line by the position of the umbilicus and the linea alba. The glans penis and meatus should be carefully wiped off with warm bichloride solution, and the prepuce, well retracted, so that the penis can be held in the sulcus, which will prevent its slipping from the examiner's fingers.

Sterile towels are now placed over the patient's thighs and abdomen to prevent contact with the surgeon's hands or instruments. A sterile operating sheet, with a slit in the centre for the penis, is even better.

For examining the urethra for stricture, the best instrument to use is the flexible bougie à boule (Fig. 50) selecting one that will readily enter the meatus. The penis is held at right angles to the body by means of the thumb and index-finger of the left hand, which grasps it in the sulcus behind the corona. As the bougie, properly cleansed and lubricated and held lightly between the right thumb and forefinger, slides slowly and gently down the canal it imparts to the examiner an accurate idea of the condition of the urethral walls: whether they are inelastic and rigid, soft and pliable, or the seat of stricture, in which last case it will slip through the contraction with a jerk, especially as it is being drawn out.

A steel sound, or olivary bougie, is not suitable for this examination, as these instruments are conical and liable to dilate a soft stricture, and not detect it, and in this way give the examiner a faulty idea as to the real condition of the canal. After the stricture has been located with the bougie à boule we may obtain additional information with regard to its size, the location of its orifice, whether central or eccentric, the condition of the mucous membrane, etc., by examination of the face of the contraction with the urethroscope. Great care must be taken to avoid trauma, however, and it may often be advisable to postpone this procedure to a later occasion.

Method of Passing a Sound.—An instrument is selected that enters the meatus with ease; it is properly cleansed and lubricated, and passed slowly and with the utmost care and gentleness in the following manner:

The operator stands on the left side of the patient, holding the penis in the coronal sulcus, between the thumb and index-finger of the left hand; in this way the penis is put on the stretch at right angles to, and in the median line of, the body; thus effacing the first curve of the urethra. The sound is held lightly between the thumb and first two fingers of the right hand, which rests on the median line of the abdominal

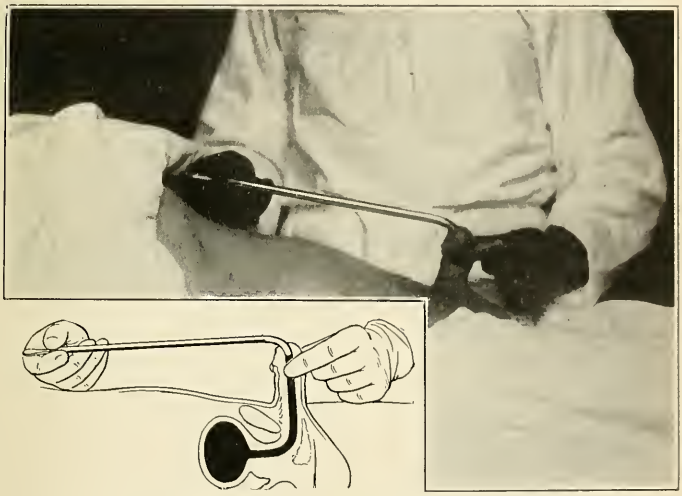


FIG. 52.—Sound entering meatus. (Original.)

wall, and the tip of the instrument is gently inserted into the meatus (Fig. 52).

The hand, still resting on the abdominal wall, urges the sound gently into the urethra, the penis at the same time being drawn upward, so that the surgeon's hands approach each other (Fig. 53). At this time the tip of the sound is just entering the bulb. The left hand now drops the

penis, which is swept slowly downward and at right angles to the body by the sound, whose tip now rests against the opening in the triangular ligament, and its convexity in the bulb of the urethra (Fig. 54).

In order to reach the prostatic portion, the handle of the instrument is gently depressed, it being now held in the left hand (Fig. 55). The patient usually complains at this

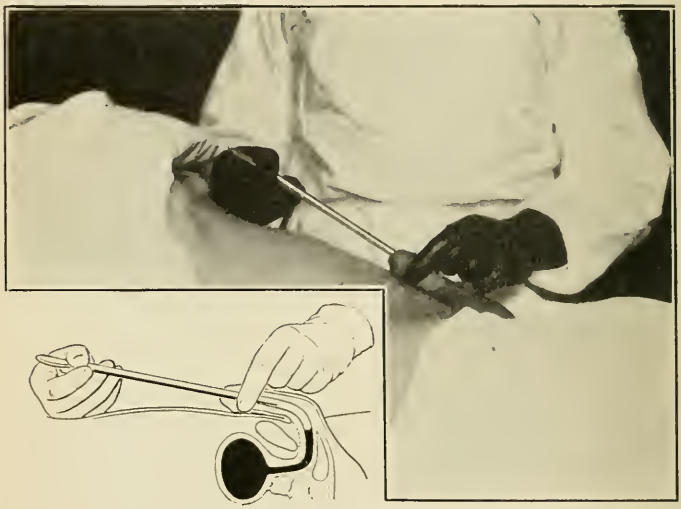


Fig. 53.—Tip of sound entering bulbous urethra. (Original.)

time of a desire to urinate, owing to the pressure of the instrument on the mucous membrane of the prostatic urethra, which is extremely sensitive, even in health.

If the bladder is to be explored, the handle of the sound is depressed still farther between the thighs and pushed gently upward, when it will be felt to glide easily into the bladder (Fig. 56).

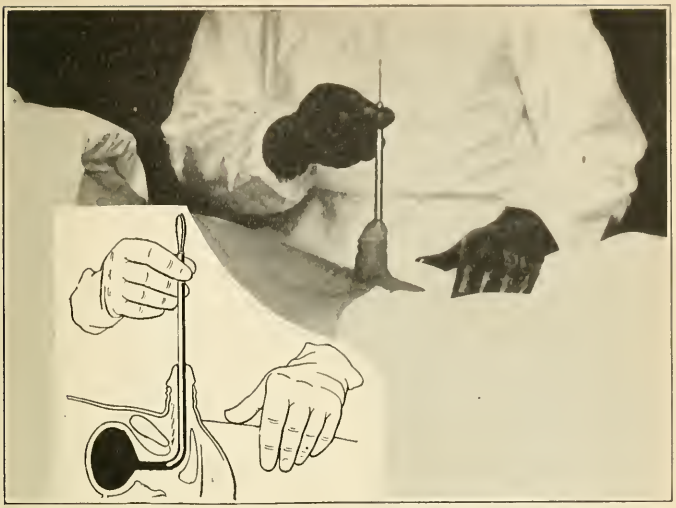


FIG. 54.—Tip of sound resting against anterior surface of compressor urethræ musele (membranous urethra). (Original.)

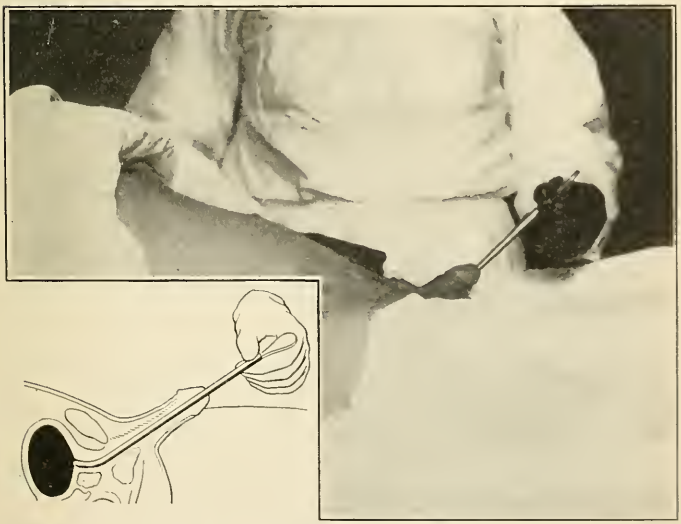


FIG. 55.—Convexity of sound resting on the floor of the prostatic urethra. (Original.)

Endoscopic tubes, cystoscopes, urethrocystoscopes, stone-searchers, lithotrites, evacuating tubes, and in fact, all instruments used in the deep urethra and bladder are introduced in the same manner as above described, always remembering to employ the utmost care and gentleness, when, as a rule, the instrument will find its way into the deep urethra and bladder, with only a reasonable amount

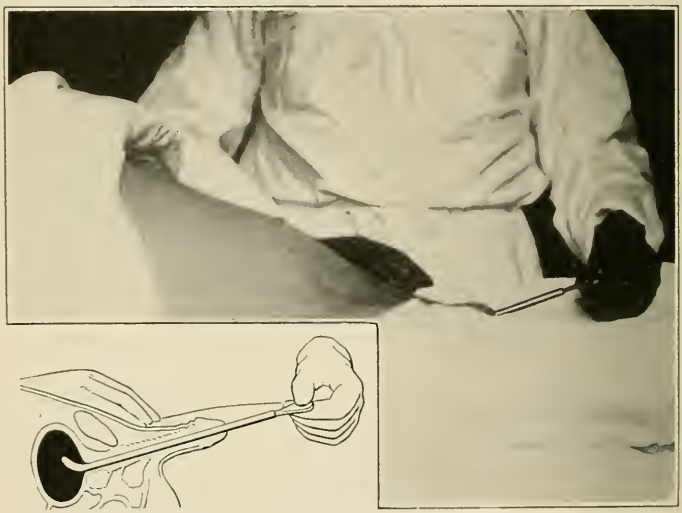


FIG. 56.—Tip of the sound in the bladder. (Original.)

of assistance from the surgeon. Quick, rough, and unskilful instrumentation invariably leads to muscular spasm, which in turn means difficult or even impossible instrumentation, and may result in a prostatitis or even prostatic abscess.

In examining old men the tip of the instrument will some-sometimes catch or hitch in the bulb, as in these cases it is often in a more or less relaxed and sacculated condition,

and is easily carried on the tip of the sound for a short distance upward and beneath the membranous urethra. This difficulty can be easily obviated by keeping the tip of the instrument in close contact with the roof of the canal; a point which applies equally well to cases of posterior median hypertrophy of the prostate gland.

If the flexible bougie à boule detects a stricture, we must then ascertain its exact distance from the meatus and its caliber. The bougie having been passed down to the obstruction, the distance down is noted by holding the thumb and finger on the shaft of the instrument at the meatus; it is then withdrawn, when the distance between the finger and thumb and the bulb of the instrument is measured, which gives the exact depth of the contraction in inches. Smaller bougies à boule are tried until one finally passes the obstruction, which, of course, gives its caliber or size.

If the stricture is so tight that it will not admit our smallest olivary bougie, or bougie à boule, we then employ whalebone filiform bougies.

In passing filiforms it is best to keep the penis on the stretch and at right angles to the body, and try to avoid the lacuna magna on its roof, in which these little instruments sometimes catch. The tip of the instrument may be left straight, or turned and twisted in various ways and shapes, as already shown. The urethra having been injected with a solution of adrenalin chloride 1 to 1000, to reduce the congestion of the mucous membrane over the face of the stricture, the canal is then fully distended and lubricated with warm, sterile olive oil, and a filiform is passed down to the face of the contraction, and rotated slowly and carefully until it engages in the opening of the stricture; if this does not occur we pass another filiform alongside the first,

and so on, until one finally enters the opening in the contraction and passes through, when it is left *in situ* and the others removed. If this is impossible, we speak of it as an impassable stricture; that is, impassable to instruments, although even yet the urine can often be voided in drops or even in a fair-sized stream.

If the patient has such an abnormally small meatus (16 to 18 French) that it will not admit bougies or sounds of a sufficent size to examine the urethra properly, and if it is not thought wise to enlarge the meatus at the time by meatotomy, then we may employ for exploratory purposes the Otis urethrometer in the following manner: It is cleansed, lubricated, gently passed into the bulb, and screwed up to about No. 28 or 30 of the French scale. As the instrument is slowly and gently withdrawn the stenosed areas or spots of thickening are noted, great care being taken not to diagnose physiological contractions and the circular muscular fibers of the urethra as strictures, which mistake can easily be made if the examiner overexpands the bulb of the instrument, or if he is unfamiliar with the anatomy of the canal.

CHAPTER XIV.

TREATMENT OF STRICTURE.

The treatment of stricture depends entirely upon its cause, situation, and extent, and whether it be soft and yielding, or dense and fibrous in character. As a broad, general rule, however, it may be stated that the best routine treatment for the majority of cases of gonorrheal stricture is gradual dilatation with bougies and sounds combined with local urethral applications and internal medication. If these methods fail or cannot be employed, we are then compelled to resort to one of the cutting operations about to be described.

Traumatic and congenital strictures, being fibrous from their incipiency, do not yield to dilatation, and must therefore be treated by meatotomy, urethrotomy, or perineal section, according to their location.

The urine should be carefully examined in order to ascertain the condition of the kidneys, and the extent and severity of the urethral and bladder inflammation, if these conditions are present.

If any complications exist, they must be treated in the manner already given for such affections, to which the reader is referred. Kidney disorders are to be handled on general medical and surgical principles. The reaction of the urine must be modified either by the administration of urotropin or helmitol, as indicated, and the patient's diet

carefully regulated, so that we may render the urine as bland and non-irritating as possible.

Strictures of or Near the Meatus.—Strictures in this situation do not yield to dilatation and must therefore be cut (meatotomy). The normal meatus varies from No. 21 to 28 French, and should never be interfered with unless absolutely necessary, as overzealous cutting of this part of the canal leads to a flat, spluttering stream that cannot be thrown any distance from the body, and a disagreeable dribbling of urine after each act of urination, also a feeble and unsatisfactory ejaculation, of which some patients complain bitterly. If the meatus is so small that normal urination is interfered with, or that proper treatment cannot be applied to the parts beyond, then it may be cut up to No. 28 or even 32 of the French scale, according to the requirements of each individual case.

Strictures of the Penile Urethra.—Strictures of the penile or pendulous urethra include all of those contractions which are situated between the meatus and the junction of the penis with the scrotum. If these contractions are soft and yielding, gradual dilatation should be tried with filiform or olivary bougies or the steel sound. If dilatation causes such pain or irritation that it is found impracticable, it should be stopped and the stricture cut (internal urethrotomy), either with a straight, blunt bistoury, if near enough to the meatus, or with a urethrotome, if further down the canal. For a description of this operation the reader is referred to page 158.

Strictures beyond the Penoscrotal Junction.—For strictures situated in the bulbous portion of the urethra, or at the bulbomembranous junction, that are soft or even semi-fibrous, we should always try gradual dilatation and local urethral medication before resorting to any cutting operation.

Should dilatation fail, the stricture is then cut by external urethrotomy.

Gradual Dilatation.—By gradual dilatation is meant the gentle passage of filiform bougies, olivary bougies, or steel sounds through the stricture, the selection of the dilating instrument depending upon the size or caliber of the contraction, which was ascertained and noted at the time of examination.

Instruments.—If the stricture is under 18 French, we should use filiform or olivary bougies, but if 18 French or over, steel sounds should be employed.

Gradual dilatation is performed every fifth or seventh day, depending upon the reaction and results obtained; these can be noted by the patient's sensations, and the appearance of the urine, which should be examined at each visit.

The dilating instrument should be warm, well lubricated, passed slowly and gently, and left in the urethra for a minute or so, in this manner exerting pressure on the thickened and infiltrated urethral walls, which in many cases resume their normal consistency as the result of the absorption of the inflammatory material.

The size of the bougies or sounds must be increased slowly and guardedly in the following manner: If a stricture takes a No. 15 French at the first visit, the surgeon should pass at the second visit a No. 15 and 16, and even higher numbers, provided they do not cause too much pain or bleeding, and so on until he has reached No. 28 or 32 of the French scale, according to the requirements of the case.

By the careful employment of gradual dilatation combined with local urethral medication, many cases of even filiform stricture may be dilated up to No. 30 French and over, as the case may require, and be kept so for the remainder of

the patient's life, provided he will have a sound passed a few times during the year.

While the stricture is being dilated, the urine must be kept bland by a carefully regulated diet, and, if necessary, the internal administration of urotropin in full doses, with plenty of still water. Alcohol in all forms must be prohibited, and sexual relations refrained from, if followed by irritation.

Complications.—If the surgeon is hasty, unskilful, or uncleanly in his urethral manipulations, he may cause such complications as urethritis, urethrocystitis, epididymitis, prostatitis, abscess of the prostate, false passages, laceration of the urethra, with urinary extravasation, urethral chills and fever, or retention of urine from swelling of the urethral mucous membrane and spasm of the compressor muscle.

If, after a fair trial, gradual dilatation fails, we shall then have to resort to urethrotomy, either external, internal, or a combination of both, depending on the seat and extent of the strictured area.

Continuous Dilatation.—By continuous dilatation is meant the retention in the urethra for several hours of the bougie or filiform that has been passed through the stricture. As a result of the long-continued pressure of the retained instrument some strictures yield sufficiently to allow of the voluntary passage of urine, and also of larger dilating instruments. It is a useful method in certain selected cases of tight, but soft and yielding stricture, if the patient can be kept in bed and be carefully watched.

Rapid Dilatation.—If the stricture will only admit a filiform bougie, it may be left in place and used as a guide for a small tunnelled sound (Fig. 57), which consists of a grooved, conical steel sound, the groove terminating in a canal or

tunnel at its vesical extremity, through which the filiform guide passes. These sounds should run from about No. 6

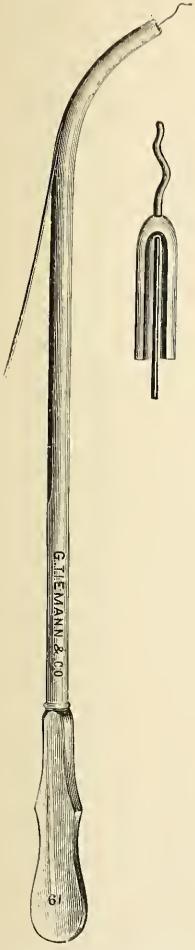


FIG. 57. — Gouley's tunnelled sound and filiform in place.

FIG. 58.—Kollman straight dilator.

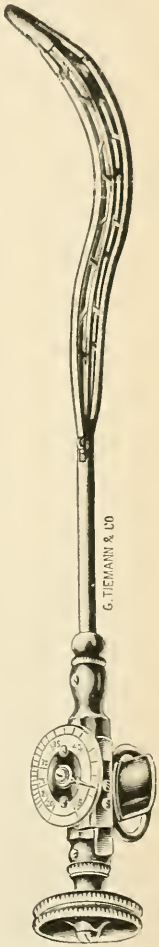


FIG. 59.—Kollman curved dilator.

to 18 French, inclusive, and must be well made, so that the edges of the tunnel will not cut the filiform bougie, which should pass easily through it, as such an accident may result in the loss of the distal fragment of the filiform in the posterior urethra or bladder. The sound is passed over the filiform guide and through the stricture, which can in this manner be dilated through several sizes at one sitting, provided it is soft and yielding, the subsequent dilatation being carried out with bougies and sounds.

This method of rapid dilatation is in reality a form of divulsion, and is attended with more or less risk, even in the most skilful hands, and is therefore not to be employed except in an emergency, and unless the patient can remain in bed, with proper constitutional and local treatment.

Divulsion.—The treatment of stricture of the urethra by divulsion with specially constructed straight or curved instruments (dilators) (Figs. 58 and 59) is dangerous, inexact, and rough, as compared with gradual dilatation and the various forms of urethrotomy, and should therefore never be employed, on account of the traumatism inflicted on the delicate urethral and periurethral tissues which, in reality, are lacerated and torn, with the subsequent formation of additional cicatricial tissue.

Electrolysis.—As electrolysis is only of questionable service in strictures of the "soft" variety, it is merely mentioned to be emphatically condemned, as in this variety most brilliant results are obtained by gradual dilatation, and instillations of silver nitrate. It has no effect whatsoever upon fibrous or innodular strictures, which demand free incision, either from within or without, depending upon their situation in the canal.

Urethrectomy. By urethrectomy is meant either the partial or complete resection of all of the stricture tissue at the time of an external urethrotomy or perineal section, and the building up of a new urethra, sutured about a retained soft-rubber catheter or tube. (See discussion of external urethrotomy, page 167.)

Meatotomy.—Before performing meatotomy the patient urinates, in order to flush out the canal, and lies on his back; the external genitals are cleansed, as is also the urethra, by irrigations of warm boric acid solution, and the parts surrounded with sterile towels. Local anesthesia may be caused by injecting a little 2 per cent. novocain or alypin solution into the urethra, which produces its full effect in about ten minutes; or by infiltrating, by hypodermic injection, the region to be incised with a few drops of one of these solutions. The prepuce is retracted and the penis grasped in the sulcus behind the corona; then, with a straight, blunt bistoury, the meatus is slowly incised downward on its floor and directly in the median line up to about No. 28 to 32 of the French scale.

FIG. 60.—Meatus sound.

Contractions just beyond are dealt with in the same manner, except that a little cutting may have to be done in the median line of the roof of the urethra; this fact having been ascertained at the time of the first examination.

A full-sized meatus sound (Fig. 60) is then passed through the meatus to see that all is clear, and the passage repeated daily to prevent contraction of the little wound, until healing is complete.

If bleeding occurs, it can be readily controlled by pressure with a plug of gauze and a light gauze dressing.

Internal Urethrotomy.—This operation consists of the division of the stricture within the urethra, the incision being made on the roof of the canal and directly in the median line, either from before backward, or from behind forward, depending upon the kind of urethrotome employed, thus producing a linear wound. When the operation is properly performed there will be little or no danger of wounding either of the corpora cavernosa, as the cut is situated below and between them, in the base of the septum pectiniforme.

As a rule, internal urethrotomy should be limited to undilatable strictures situated in the pendulous urethra and not farther down the canal than the penoscrotal junction, unless it is combined with external urethrotomy for the purpose of properly draining the bulb.

Instruments for Internal Urethrotomy.—Instruments for this purpose are called urethrotomes, of which there are many forms and varieties. The surgeon should always have two or three of these instruments, as no single one is adapted to all cases. If the stricture is near the meatus, it may be nicely cut with a straight, blunt bistoury or a Gouley beaked knife (Fig. 61).

Maisonneuve's urethrotome (Fig. 62) consists of a small grooved shaft with a short curve. The groove carries the blade, and is situated on the concave surface of the staff, stopping at the point where the curve begins. The distal end of the staff has a screw tip, to which may be attached a filiform guide; or it may have a tunnelled, or a solid tip. The blade, fastened to a long stylet, is triangular in shape, sharp in front and behind, but blunt at its apex, so as not to cut the healthy urethra.

FIG. 61.—Gouley's beaked bistoury.

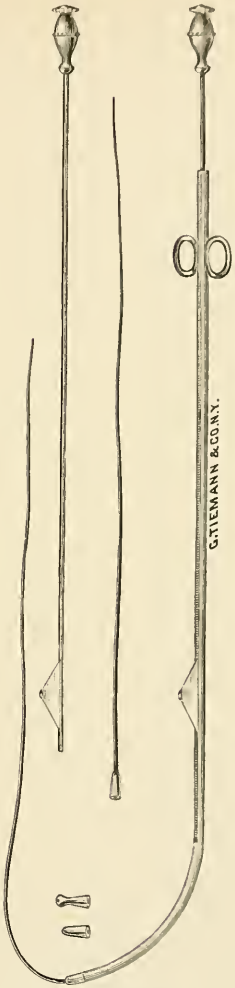


FIG. 62.—Maisonneuve's urethrotome.

FIG. 63.—Fluhrer urethrotome.

The instrument is used as follows: The staff, with its solid tip, is passed into the bladder and held firmly in the median line of the penis, which is pulled forward on the stretch; the blade is then slipped into the groove and pushed down, cutting the contractions before it; it is then withdrawn, the penis and staff being held in exactly the same position.

If the staff cannot be introduced alone, it can be screwed to the filiform, which it will follow; or it may be passed over a long whalebone filiform bougie threaded through the eye in the tunnelled tip.

The Fluhrer urethrotome (Fig. 63) consists of a straight No. 12 French grooved staff, the groove for the knife being situated on the upper surface of the instrument and terminating in a tunnelled tip, which is slightly curved upward. The blade is like the Maisonneuve and cuts to about No. 24 French. A whalebone filiform bougie is passed into the bladder and its end slipped through the tunnelled urethrotome, which is introduced over it through the stricture. The penis is held on the stretch in the median line, the knife pushed down the groove, and the stricture cut from before backward.

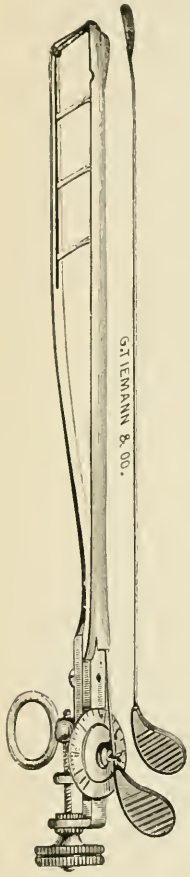


Fig. 64.—Otis urethrotome.

The Otis urethrotome (Fig. 64) is a dilating and cutting instrument combined. It consists of two steel shafts, which, when closed, are about No. 16 French; these shafts are connected by short bars, like

a parallel ruler, which can be opened or closed by means of a screw at the handle of the instrument, which at the same time indicates on a little index the caliber to which they are opened. The blade running in a groove in the upper bar becomes concealed in a slot when it reaches its extremity.

The instrument, with blade concealed in its tip, is passed just beyond the stricture and gently and slowly dilated until the stricture feels slightly tense, when the blade is drawn out, cutting through the stricture on the roof of the canal and exactly in the median line, and from behind forward. The blade is then pushed back and concealed, the shafts partially approximated, and the instrument withdrawn.

This urethrotome is a most serviceable instrument, provided the urethra is not overdilated and unnecessarily incised.

Internal urethrotomy having been decided on, the urine must be examined in order to ascertain the condition of the kidneys and whether the bladder or urethra is the seat of inflammation. If diseased conditions exist, they must be treated on the lines already laid down. The patient is kept very quiet in the house for twenty-four hours before the operation and his general condition carefully attended to in every detail. Alcohol in all forms must be stopped and the urine rendered bland by a light, nutritious, and non-irritating diet, and proper internal medication, including urotropin and plenty of water. The bowels should be freely opened before the operation and kept so afterward. If the kidneys will not allow of ether, the urethra may be anesthetized with a little 2 per cent. alypin solution, or general anesthesia may be induced by nitrous oxide and oxygen.

The patient having urinated, is prepared as usual. If

possible, the urethra and bladder are thoroughly irrigated with warm boric acid solution by means of a four-ounce hand-syringe and catheter, and the cutting performed either with a straight, blunt bistoury, if near enough to the meatus, or with a urethrotome, if further down the canal.

The incision with the bistoury is made directly in the median line and on the roof of the urethra. A No. 28 to 32 French steel sound is then passed, and the divided contraction kept open by passing sounds every other day until the wound is healed, when the intervals between instrumentations can be made much longer.

If the stricture is any distance from the meatus, it should be divided with one of the urethrotomes just described, and which is most suitable to the case. As a general rule, it is safe to say that the Maisonneuve and Fluhrer urethrotomes are the best instruments for strictures of small caliber, while the Otis instrument is serviceable for the larger ones.

The stricture having been cut, the urethrotome is taken out and a full-sized bougie à boule, or steel sound, should be passed, to see that no bands or constrictions are left, after which the urethra and bladder are again irrigated with warm boric acid solution, several ounces of which are left in the bladder with the idea of diluting the urine and rendering it less irritating as it is voided over the wound in the urethral wall after the operation.

The operation being completed and bleeding controlled, the patient is put to bed, with a light sterile gauze dressing around the penis.

The stricture, having been cut up to No. 28 or 32 French, is kept open by dilatation, which, with urethral and possibly vesical irrigation, is begun on about the second day after the

operation, and continued, as already described, daily or every other day.

If internal urethrotomy is performed in this manner, we will not have such unnecessary complications as severe, and sometimes even fatal, hemorrhage, urethral chills and fever, permanent curvature of the penis, etc. In this operation, no matter what instrument is employed, it should always be held firmly in the median line; and the penis pulled out over it, and put well on the stretch by an assistant so that the incision will be as nearly as possible in the median line of the roof, thus avoiding injury of the corpora cavernosa, with subsequent and sometimes profuse hemorrhage.

External Urethrotomy.—For strictures situated in the bulbous, the bulbomembranous, or membranous portion, we should perform external urethrotomy or perineal section; the object of the external cut being to drain the bladder and the bulb through the perineum, and in this manner prevent the accumulation and absorption of any irritating or infectious secretion that might occur (urinary fever).

The following perineal operations are for bladder-drainage and for the relief of strictures of the bulbous, the bulbomembranous, and membranous portions. The preparation of the patient and the instruments for all of these operations are the same, and to prevent repetition will be described here, and not with each special operation.

The condition of the kidneys must be carefully looked into, by uranalysis of the twenty-four-hour specimen, and disease, if it exists, must be treated on the usual medical or surgical lines. The patient is kept very quiet in bed for a day or so before the operation, and his general health is put in as good condition as possible by a light diet and rest. Alcohol must be stopped and the urine rendered bland and

non-irritating by the administration of urinary antiseptics. The liberal use of any pure water is also advisable before these operations.

If possible, the bladder and urethra should be irrigated

FIG. 65.—Lithotomy position for external urethrotomy—scrotum retracted to expose operative field—staff renders urethra prominent. (Author's case.)

daily with warm boric acid or salt solution for several days before the operation.

The bowels should be freely moved with calomel the day prior to the operation, just before which the rectum is cleansed with a hot saline enema.

The patient, being anesthetized, is placed in the lithotomy position on the extreme end of the table, on a Kelly pad (Fig. 65). The patient must be in a good light, and held there flat on his back and exactly in the median line by leg-holders.

All aseptic precautions are observed, as in any operation.

External Urethrotomy with a Guide. —The patient being prepared for operation and anesthetized as already described, the anterior urethra is injected with a drachm or two of (1 to 1000) adrenalin chloride and then distended with warm, sterile olive oil. Then a whalebone filiform bougie is passed through the stricture into the bladder.

The author's tunnelled staff (Fig. 66) is then passed over the filiform to the anterior face of the stricture and held there exactly in the median line by an assistant, who, pressing the instrument downward, renders the perineum tense and at the same time retracts the scrotum, thus exposing the operative field (Fig. 65).

The operator then cuts down on the groove on the convex surface of the staff, being careful not to cut the filiform guide as it emerges from the tip of the staff. The urethra is opened by a single clean incision, which thus

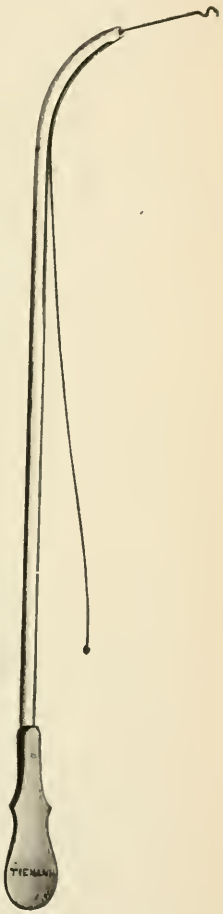


FIG. 66. — Author's grooved and tunnelled staff with filiform in place.

exposes the staff, and the filiform bougie entering the stricture (Fig. 67).

The staff is now withdrawn and the filiform drawn down through the penis and out of the perineal wound, its distal

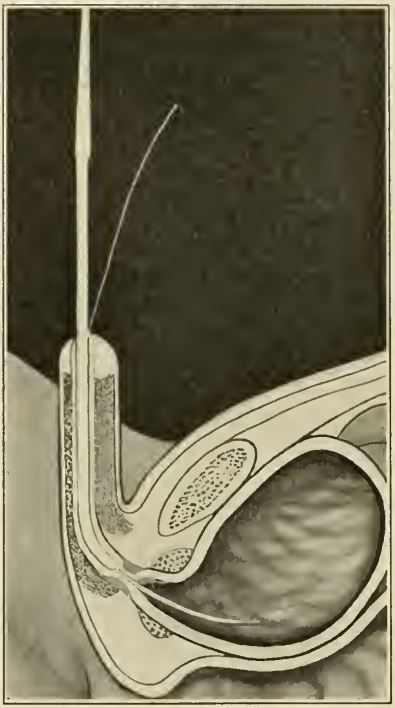


Fig. 67.—Tip of staff in contact with anterior face of stricture and filiform passing through it into bladder. (Schematic drawing.) (Original.)

end remaining in the bladder through the opening in the stricture.

An Arnott grooved director (Fig. 68) is now passed into the bladder by the side of the retained filiform, which is then removed.

The director being firmly held in the median line, with its groove directed upward, a beaked bistoury (Fig. 61) is passed in its groove, and the stricture cut on the roof of the urethra; the bistoury is then withdrawn, the probe inverted so that its groove looks downward, and the stricture incised on the floor of the urethra in the same manner as on the roof.

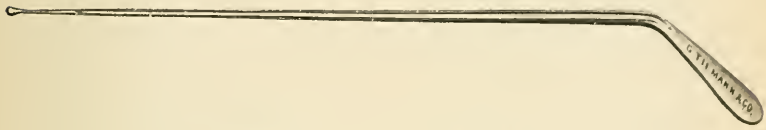


FIG. 68.—Arnott's grooved director.

A gorget (Fig. 69) is now passed through the thoroughly divided stricture into the bladder, from which the urine flows.

The index-finger is now passed through the perineum into the bladder to see that all stricture tissue is thoroughly

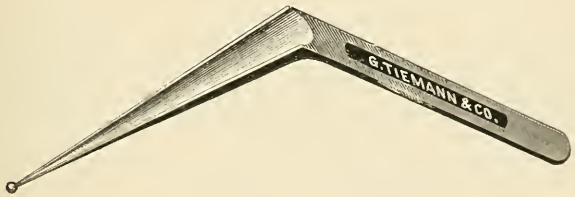


FIG. 69.—Teale's gorget.

incised and to dilate the prostatic sphincter and thus prevent postoperative spasm.

In some cases of extensive traumatic stricture in which there is a very dense form of scar tissue, it may be necessary at this point to resort to urethrectomy, *i. e.*, the partial or complete excision of all the stricture tissue, with the

building up of a new urethra by suturing together the divided ends of the canal about a retained soft-rubber catheter.

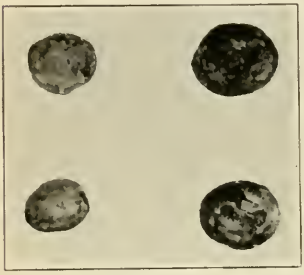


Fig. 70

Fig. 71

Fig. 72

Fig. 70.—Four calculi removed from pendulous urethra with urethroscope. Actual size. (Author's case.)

Fig. 71.—Two calculi removed from bulbous urethra by external urethrotomy. Weight, 17 grains. (Author's case.)

Fig. 72.—Calculus removed from bulbous urethra by external urethrotomy. Weight, 49 grains. (Author's case.)

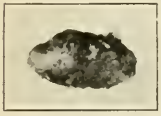


Fig. 73

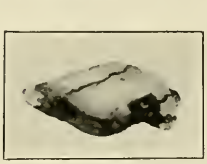


Fig. 74

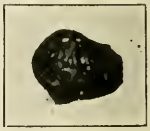


Fig. 75

Fig. 73.—Calculus removed from bulbous urethra by external urethrotomy. Weight, 15 grains. (Author's case.)

Fig. 74.—Calculus removed from bulbous urethra by external urethrotomy. Weight, 26 grains. (Author's case.)

Fig. 75.—Calculus removed from bulbous urethra by external urethrotomy. Weight, 11 grains. (Author's case.)

The deep urethra and bladder should always be explored by the index-finger, as in these cases small calculi or concretions are sometimes found in the prostatic urethra or

bladder (Figs. 70 to 75); besides which, the finger passed into the bladder dilates the prostatic urethra, which is usually contracted in these cases, thus preventing in a great measure postoperative tenesmus, and also detects any stricture tissue that has not been properly divided on the roof of the canal.

If the caliber of the stricture is sufficiently large to permit of the passage of the tunnelled staff through it into the bladder, the use of the filiform bougie will not be necessary, the steps in the operation, with this exception, however, being the same as those outlined above.

The finger having been passed into the bladder, a perineal tube of about No. 30 to 35 French (Fig. 76) is passed over

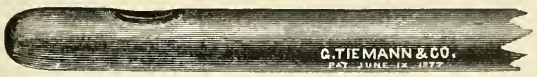


Fig. 76.—Otis's perineal drainage tube.

it and held in the bladder by means of a silk suture, which, being passed through both edges of the wound and the tube, is securely tied. The bladder is irrigated with warm boric acid or salt solution, which is thrown in by means of a hand-syringe or irrigator through the perineal drain, which, when the bladder is partially filled with warm solution, should be clamped, to retain a few ounces of fluid in the bladder until drainage is established. Bleeding-points are caught and ligated, the wound packed with sterile gauze, and the dressing held in place by a firm T-bandage. When the patient is put to bed the clamp is taken off and the perineal tube is attached to a piece of rubber tubing by means of a glass coupler through which we can see whether the

bladder is draining properly or not. The tubing terminates in a bottle under the bed (Fig. 77), which is one-quarter filled with 1 to 1000 bichloride solution; this keeps the urine which runs into it sweet, and prevents the entrance of air into the bladder. If the tube fails to drain, it may be due

Fig. 77.—Perineal drainage of bladder. (Original.)

to the plugging of the eyes with clots, which can be dislodged by injecting the tube with boric acid solution by means of a large hand-syringe. The perineal tube is left in place for forty-eight hours, during which time the bladder may be irrigated through it, once or twice a day, with warm boric acid solution. The anterior urethra should

receive similar irrigations, given through a small soft-rubber catheter.

After the tube is removed, full-sized sounds must be passed daily, at first, and then every other day, followed by bladder and urethral irrigations, the patient being allowed to be up and about. When the perineal wound is cicatrized the interval between sounds is made longer and the chronic urethritis is treated, as already described, until cured. Even then these patients should be examined, at intervals of a few months, for several years after all symptoms have disappeared, to forestall any contraction of scar tissue and recurrence of the stricture.

External Urethrotomy without a Guide.—This operation is employed in cases that will not admit of the passage of any instrument through the stricture.

The patient is prepared and placed on the operating table, as above described, and a last attempt made to enter the bladder under general anesthesia.

This failing, a Hayden staff is passed down to the anterior face of the stricture, with its groove toward the perineum, and held there by an assistant, who at the same time retracts the scrotum.

The operator cuts down on the staff, through the perineum, opening the urethra, on the groove of the instrument, just in front of the stricture; the cut edges of the urethral wound are then retracted by Allis's clamps (Fig. 78).

The staff is now withdrawn and the divided urethra held well open with the clamps. The operator now has a clear view of the anterior face of the stricture. This is carefully examined for its opening by means of a whalebone filiform or Arnott's grooved director, which, if possible, is passed through it into the bladder.

The stricture is divided with Gouley's beaked bistoury on the director, as described in the previous operation, and the index-finger is passed to the bladder for dilatation of the prostatic urethra, exploration of the bladder, and to ascertain if all of the stricture tissue has been completely divided. A full-sized sound is now passed from the meatus to the bladder to see that no contraction has been left.

The drainage, dressing, irrigation, and postoperative dilatation are the same as in the perineal operation above detailed.

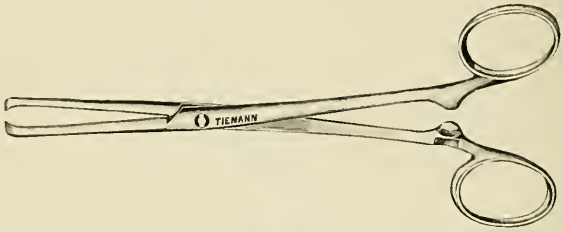


FIG. 78.—Allis's clamp.

If the opening in the stricture cannot be found, the surgeon will then have to complete the operation without a guide, cutting through the stricture slowly and carefully in the median line, with perhaps the index-finger of the left hand in the rectum, which, pressing up against the membranous urethra, keeps the operator informed as to the proximity of the rectum and the position of the apex of the prostate gland, both of which are valuable landmarks.

This part of the operation will be much simplified by keeping the operative field thoroughly sponged, and the urethral wound well retracted, so that the surgeon can see the progress he makes. The application of a solution of adrenalin (1 to 1000) is often useful to prevent obscuring

of the operative field by oozing of blood. The shining mucous membrane of the roof of the urethra is also a serviceable guide, as it can be plainly seen and felt.

Perineal Section.—This operation is performed in those exceptional cases which will not admit of the passage of any instrument through the anterior urethra. It is therefore done without a guide, and is, at best, a very difficult and oftentimes tedious procedure.

The usual preparations for perineal operations having been made, the surgeon makes a last attempt to pass a filiform guide under ether, which, if accomplished, converts the difficult perineal section into a simple external urethrotomy.

The steps in the operation are as follows: The index-finger of the left hand is introduced into the rectum, and its tip kept in contact with the apex of the prostate gland. A free incision is made, layer by layer, in the median line of the perineum, down toward the anus, in the endeavor to open the urethra just at the apex of the prostate; or the operator can cut down to the urethra by careful dissection, as in an ordinary external urethrotomy.

The urethra having been found and opened, a fine, probe-pointed director is now passed through the perineal wound into the bladder, which should be explored by the index-finger, and all of the stricture tissue thoroughly divided, not only on the floor, but also on the roof of the canal, as in an ordinary external urethrotomy.

The drainage and the subsequent treatment are precisely the same as described in the other perineal operations.

The anterior stricture or strictures are divided by immediate internal urethrotomy.

Retrograde Catheterization.—If it is impossible, as it very rarely should be, to find the urethra and to enter the bladder by the perineal route, then the surgeon may perform suprapubic cystotomy, and, guided by the index-finger in the

FIG. 79.—Urethroperineal fistula. (Author's case.)

bladder, pass a silk bougie through the small suprapubic incision into the vesical orifice of the urethra, down through its prostatic portion, and out into the perineal wound, thus locating the proximal end of the canal.

This method may have to be employed in some old and

neglected cases of stricture, in which the urethra is converted into a fibrous cord, the urine escaping by fistulous tracts which open on the scrotum, buttocks, abdomen, or thighs (Fig. 79), also, in cases of extensive laceration or rupture of the urethra, caused by blows or falls on the perineum, either with or without fracture of the pelvis.

In these traumatic cases the tissues are sometimes so lacerated and filled with blood-clots that it may be very difficult or impossible to find the proximal end of the urethra. This must always be done in order to drain the bladder, and, if so desired, to approximate with fine sutures the ends of the injured canal, through which a soft-rubber catheter is passed to the bladder and retained there until the urethral wounds have cicatrized. This will in a great measure prevent the formation of traumatic or postoperative stricture.

The urethra may, however, be left to granulate with the bladder drained, and the case treated as above described under external urethrotomy for stricture; the choice of procedure resting entirely with the operator.

CHAPTER XV.

RETENTION OF URINE.

Retention of urine may occur during the course of acute gonorrhea, from spasm of the compressor urethræ muscle, caused by the intense inflammation in the bulb, prostate, or prostatic urethra. It may also be due to occlusion of the canal from a periurethral abscess, or one of the prostate, or of Cowper's gland. After rupture or evacuation of the abscess there is free and spontaneous urination. Retention is also a frequent complication of stricture of the urethra, the mucous membrane covering which becomes suddenly swollen and congested from alcoholic or sexual excesses, catching cold, bodily fatigue, irritating urine, etc. (Fig. 80). Retention of urine is of frequent occurrence after surgical operations on the perineum, genitals, rectum, anus, appendix, and herniæ, etc., being due, in these cases, to spasm of the compressor urethræ muscle. In cases of prostatic hypertrophy, retention frequently follows mild excesses in eating and drinking, sexual excitement, exposure to cold, or overexertion, or, in fact, anything that tends to congest the mucous membrane of the prostatic urethra and the prostate itself. These cases may be associated with compressor spasm caused by the prostatic irritation. It occurs not infrequently during the course of typhoid fever and similar long, exhausting diseases. Other less frequent causes are transverse myelitis, impacted urethral calculi

(Figs. 70 to 75), congenital stricture of the meatus, and marked congenital phimosis.

As a result of acute urinary retention, there is at first a mild congestion of the bladder mucous membrane, which condition, if not relieved, is soon followed by intense congestion of the entire urinary tract, thus rendering it ripe for infection, should microörganisms be introduced on catheters, aspirating needles, or examining instruments. Therefore, when treating these cases, we should avoid trauma-

FIG. 80.—Retention of urine due to stricture. Bladder distended with 90 ounces of urine (2700 c.c.). (Author's case.)

tism of the congested mucous membrane, by careful and gentle instrumentation, and be absolutely clean as to hands, lubricant, instruments, and the external genital organs. Urinary antiseptics should always be administered, and care should be taken to prevent overdistention of the bladder (Fig. 80).

Treatment.—If retention occurs during the course of an acute gonorrhea, the patient should be put in a hot sitz bath. Hot water or hot saline solution, at 116° F., may also be injected into the rectum. If these means fail to relieve the

spasm and congestion in and about the urethra, the patient must be catheterized with a medium-sized soft-rubber catheter. Should a more rigid instrument be required, we may then use straight blunt or olivary pointed silk catheters (Figs. 81 and 82), which, although firm, are very flexible and readily adapt themselves to the urethral curves. The glans and preputial cavity are washed with 1 to 1000 bi-

Fig. 81.—Straight blunt silk catheter.

chloride solution, and a sterile catheter, well lubricated, is passed slowly and gently down to and, if possible, beyond the obstruction, the urethra being gently irrigated, if so desired, with warm boric acid solution as the catheter glides slowly down the canal. After the bladder has been slowly emptied a few ounces of the warm medicated solution should be left in, when the catheter is withdrawn.

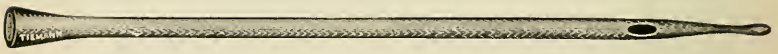


Fig. 82.—Straight olivary silk catheter.

When retention is caused by stricture of the urethra we may first try the hot bath and hot rectal injections, which in some cases are successful; if they fail, however, we then resort to gentle and sterile catheterization, using any of the instruments above described for this purpose. If we are still unsuccessful in reaching the bladder the urethra is then injected full of sterile adrenalin chloride solution (1 to 1000), which is held in the urethra for five minutes. This will

sometimes so reduce the congestion and swelling of the mucous membrane as to permit of the passage of a catheter. Should this fail, we may then distend the urethra by injecting warm sterile olive oil, which is retained by compressing the meatus, and several filiform bougies are passed successively down to the face of the stricture, the penis being held on the stretch and at right angles to the body. Each filiform is tried in turn, until one finally passes the stricture and enters the bladder; this one is always left in and the others removed. The filiform that has entered the bladder can be retained by tying it in with a piece of strong waxed

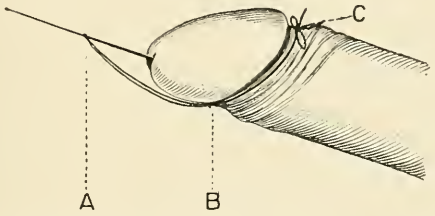


FIG. 83.—Filiform bougie tied in the urethra. (Original.)

thread or silk (Fig. 83), which is first tied securely about the filiform as it emerges from the meatus (*A*), then knotted about an inch from this point (*B*), and the two long ends brought around in the sulcus behind the corona, and tied in a bow knot on the dorsum (*C*); if the penis becomes erect the knot can be loosened. In a short time, as a result of this continuous dilatation, the urine may begin to dribble out along the side of the retained filiform, but this is not always the case. Using this filiform as a guide, we may pass either a tunnelled silver catheter (Fig. 84) over it and draw some of the urine, or several sizes of tunnelled sounds, and

in this manner dilate the stricture rapidly. If deemed advisable at this time, the surgeon should perform external or internal urethrotomy, or a combination of both, depending on the site of the stricture and the requirements of the case, using the filiform as a guide, and in this manner relieving the retention and cutting the stricture at one sitting.

Occasionally it may be possible to pass a filiform through the stricture, even when the method described above has failed, by passing an endoscopic tube down to the face of the contraction. This procedure, by dilating the urethra and smoothing out the folds over the face of the stricture, permits the operator to locate visually the opening in the contraction and to introduce the filiform guide through it.

Fig. 84.—Gouley's tunnelled catheter and guide.

If this plan also fails, and the case demands it, we must then resort to suprapubic aspiration of the bladder, passing the needle through the space of Retzius and anterior bladder wall, which, fortunately, is not covered by peritoneum when that viscus is distended with urine.

Aspiration is performed as follows: The patient is placed on his back and the operative field shaved, rendered surgically clean, and surrounded with sterile towels; a few drops of a 1 per cent. solution of novocain or cocain are then injected beneath the skin, directly in the median line and just above the symphysis; the integument over this

spot is incised for about a quarter of an inch, the author's trocar and cannula (Fig. 85) thrust downward through the little incision into the bladder and part of the urine drawn, after which a little warm boric acid solution should be thrown into the bladder through the outflow tube of the cannula by means of a hand-syringe and rubber coupler, so as not to relieve the pressure too suddenly, by completely emptying the viscus. The cannula is then removed, and the little puncture covered with a pad of sterile gauze.

If the retention is due to prostatic hypertrophy and the patient is not in too much distress, we should first try hot sitz baths and rectal irrigations, as already described,

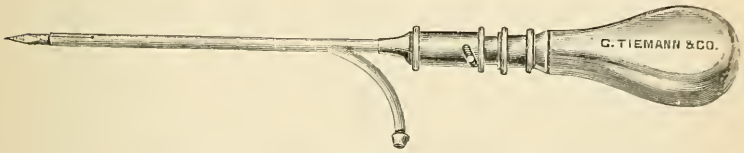


FIG. 85.—Author's trocar and aspiration cannula.

especially if it is the first attack the patient has ever had, as in such cases the urine is usually clear, instruments never having been passed, and infection is therefore very liable to occur from traumatism of the congested prostatic urethra and bladder base. These means failing, we may then resort to careful catheterization under aseptic precautions, as before described; we may use olivary or plain silk or rubber coudé catheters (Figs. 86 and 87), or silk bicoudé catheters (Fig. 88). The angle in these instruments enables them to rise over the bar or posterior median enlargement of the prostate, which is situated on the floor of the vesical orifice of the urethra. It is always best in these cases to

Fig. 86. — Olivary pointed silk coudé catheter.

Fig. 87. — Soft-rubber coudé catheter.

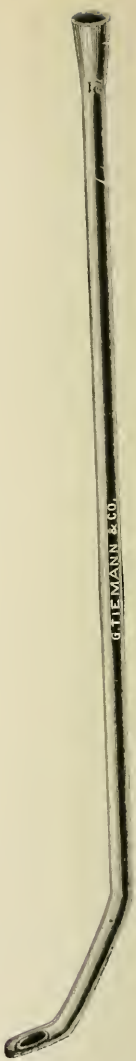


Fig. 88. — Silk bi-coudé catheter.

try the soft-rubber instruments first, as they are less liable to produce traumatism, which is the first step toward urinary infection with its train of distressing and dangerous sequelæ. If the bladder cannot be entered with any of the above instruments, then a silver catheter with prostatic curve (Fig. 89) may be employed, the surgeon always bearing in mind the traumatism that this rigid and unyielding instrument is liable to produce even in trained hands. If catheterization is impossible, the patient must be aspirated above the pubes as already described.

Fig. 89.—Silver catheter with prostatic curve.

In all cases of retention of urine, but especially in those due to hypertrophy of the prostate gland and old and tight urethral stricture, great care should be taken never to draw all of the urine, as the sudden and complete evacuation of the bladder, especially in prostatics, is very liable to be followed by severe shock and suppression, or by brisk hemorrhage in the kidneys, bladder, or both, owing to the sudden removal of pressure from the kidneys and bladder wall. If by some mistake the bladder has been completely emptied, then several ounces of a warm, sterile, boric acid or salt solution should be thrown into the bladder through the catheter or cannula and left there. As the urine is

slowly withdrawn it must be partially replaced by a warm, sterile, and non-irritating solution.

In any case of retention, no matter what the cause may be, all instrumentation of the urethra should cease as soon as there is much bleeding from the meatus, as this shows that the mucous membrane has been damaged and false passages probably produced; catheterization at this time is futile, and should therefore be abandoned for the hot bath, aspiration, and rest in the recumbent position, or, this failing, immediate perineal or suprapubic drainage. Should the patient's general condition warrant it, a prostatectomy or urethrotomy may be performed at this time, as indicated, although in the majority of cases these operations should be deferred until drainage has been established for some time and the functionating powers of the kidneys ascertained.

CHAPTER XVI.

URINARY FEVER.

Urinary fever, also known as catheter fever, urethral fever, urinary poisoning, and urinary infection, may follow any of the various operations or instrumental procedures on the urethra and bladder, especially in those cases in which the mucous membrane is lacerated, the urine septic, and the kidneys damaged.

Patients are occasionally met with in whom the easy and gentle passage of clean urethral instruments is followed by pallor, faintness, and even complete loss of consciousness; this is merely a reflex nervous phenomenon which is in no way connected with true urethral infection.

There are two main varieties of urethral fever, as follows:

In the first variety there is a slight rise in temperature, coming on after urethral operation or instrumentation, and preceded or accompanied by chilly sensations or a decided chill. These patients feel hot, uncomfortable, and restless for a short time, after which they are perfectly well.

The second variety is more severe; the chill is sudden, well marked, and prolonged, followed by a rise in temperature (sometimes as high as 105° F. or over), profuse sweating, and general depression of the vital forces. This severe form may recur with each attempt at urethral instrumentation, and is often accompanied by partial or even total suppression of urine. These patients are in a

critical condition, as their kidneys are, as a rule, more or less diseased.

The etiology of urinary fever is bacterial infection, the most common organisms being the colon bacillus, staphylococcus, and streptococcus. It is therefore more apt to occur and to be more severe in patients with damaged kidneys, septic urine and lacerated bladder and urethral mucous membrane, from which septic absorption can take place.

In order to guard against urethral fever we must be absolutely aseptic in all of our operative procedures and instrumental examinations on the genito-urinary tract, and endeavor not to produce lacerations or abrasions of the bladder or urethral mucous membrane by overzealous and rough instrumentation. Urotropin in full dose should always be administered before and after instrumentation, with copious draughts of water.

Treatment.—The patient is kept in bed and the bowels freely moved with calomel and saline in liberal dose. Alcohol baths will add to the patient's comfort. Cardiac stimulants and tonics, such as quinin and strychnin, are administered if indicated. Should there be any sign of suppression of urine we must immediately order dry cups over the kidneys and hot-air baths, or hot packs, with diuretin, or caffein-sodium-salicylate, tincture of digitalis, sweet spirits of nitre, and liberal amounts of water. Hot normal salt solution is of great service in some of these cases, and may be administered either by infusion into the median basilic vein, subcutaneously with a small aspirating-needle (hypodermoclysis), or injected into the rectum. If there are any operative wounds of the urethra, they must be kept clean by irrigation with sterile boric acid solution, and the urine

drawn with sterile catheters, or the bladder drained by perineal or suprapubic incision, or the retained or indwelling catheter. Boric acid, benzoate of soda, urotropin, or helmitol, given internally and in full dose, have marked effect on the urine, and should therefore be employed.

CHAPTER XVII.

URETHRAL INSTRUMENTS: THEIR CARE AND USE.

Before taking up, in detail, the discussion of the preparation and manipulation of the various individual instruments used in urological work, we must consider, for a moment, the general principles which govern their use.

It must be remembered that in the great majority of cases demanding urethral examination and treatment the mucous membrane is congested and more or less irritated and infected. It is imperative, therefore, that all instruments coming in contact with it be absolutely sterile, and that their surfaces be smooth, highly polished, and non-irritating. Also that the surgeon be so careful, gentle, and skilful in his instrumental manipulations that he does not cause contusions, abrasions, or lacerations of the mucous membrane, over which purulent urine subsequently flows, the septic material from which, being absorbed by the wounded mucous membrane, is very apt to give rise to alarming and even fatal manifestations; this point is of paramount importance and is not always sufficiently appreciated. We should always remember that traumatism is the first step in urinary infection.

The examiner must never forget that extreme gentleness is of as much importance as the proper cleansing of his instruments, and that many of the methods advocated for this latter purpose with formalin, formaldehyde, etc., are

liable to render the surface of flexible instruments so rough and irritating to the urethral mucous membrane that they are really unfit for practical use, although from a laboratory standpoint they may be absolutely sterile and harmless. If instruments have been sterilized in this manner, they should always be dipped in a sterile boric acid solution and their surfaces tested prior to use, in order to prevent urethral and bladder irritation.

Sounds should be kept separate from each other to prevent scratching or denting of their nickel-plated surfaces, which ought always to be intact, smooth, and highly polished. When passed on a patient they should be washed with soap and hot water, dried on sterile gauze, and dipped up to the handle in alcohol, which is then lighted and allowed to burn off; or after washing, the sound may be boiled for a few minutes in a 2 per cent. carbonate of soda solution (to prevent rusting), or plain water, if this method be preferred to the flaming process. The sound can now be cooled, if so desired, by dipping it in cold sterile water or boric acid solution.

Tunnelled sounds are prepared in the same manner as ordinary sounds, great care being taken to render the tunnelled portion and groove clean, with a stiff nail-brush and plenty of soap and hot water, before the instrument is subjected to the flaming or boiling process.

Endoscopic tubes must be very carefully washed inside and outside with hot soapsuds, dried on gauze, and then flamed off with alcohol; or boiled in soda solution; their obturators are cleansed in a similar manner.

Silk Olivary Bougies and Bougies à Boule.—These instruments should be soft and flexible, with smooth and highly polished surfaces. They can be boiled in plain water for a

few moments, and then placed in cold boric acid solution. When not in use they should be laid away straight, and separate from each other. Before using these instruments we should always test their strength, as they deteriorate with age, and may become so weakened as to break off in the canal and slip into the bladder (see Fig. 91).

Whalebone Filiforms.—Filiforms must be kept straight, as coiling or bending roughens and splits their surface, thus rendering them unfit for use. It is well to keep them in tightly covered metal cases, as they are liable to be attacked by a parasite, which renders them brittle and useless. They should be washed in soap and cold water, dipped in alcohol, and dried on sterile gauze, after which they can be placed in cold sterile water or boric acid solution. All this should be done only a few minutes before they are to be used, as long immersion in watery solutions renders them too soft and pliable to pass through tight strictures.

Urethrotomes.—These instruments are difficult to clean, and therefore require a thorough and careful scrubbing with a stiff brush and plenty of soap and hot water, especially in their grooved and jointed portions. They are then dried with absorbent gauze, boiled for a few minutes in 2 per cent. carbonate of soda solution to prevent rusting, or flamed with alcohol. The blades should not be boiled or flamed, even for a short time, as it destroys their keen edge; they are, therefore, first washed in soap and hot water, wiped with sterile gauze, and then laid in alcohol, from which they are taken for use.

Lithotrites.—These instruments are taken apart, and sterilized in the same manner as just described for the urethrotome. The handle of the Bigelow instrument must not be boiled.

Silver catheters with their obturators or stylets are washed with soap and hot water, and their interior injected first with hot soapsuds and then with alcohol; they may then be boiled or flamed off with alcohol. The tip beyond the eye should be made solid, so as to prevent any form of dirt or lubricant from collecting there.

Litholapaxy Tubes.—The technic for sterilizing these instruments, together with their obturators or stylets, is exactly the same as that just described for the ordinary silver catheter.

Tunnelled Catheters.—These instruments are cleaned in the same manner as the ordinary silver catheters, great care being taken to see that the tunnelled portion and groove is thoroughly cleaned, by scrubbing with a stiff brush and plenty of hot soapsuds, before boiling or flaming.

Woven Catheters.—These instruments are covered with gum, varnish, or shellac, which gives them a smooth and highly polished but very delicate surface, which should always be intact when used. These catheters are so constructed that they can be boiled for a few minutes in plain water, after which they may be dipped in cold sterile water or boric acid solution to restore their rigidity, if so desired. They should be laid away straight and not in contact with each other.

Soft-rubber Catheters.—These are the catheters of choice and should, if possible, be used in preference to either woven silk or silver instruments in all cases. The surgeon should always buy the highest grade of these instruments, as the inferior ones have a rough, irritating surface, poorly constructed eye, and lose their elasticity in a short time. The eye should be placed as near the tip of the instrument as it possibly can be, or the tip made solid, thus obviating a

dangerous lurking-place for lubricants and dirt. Soft-rubber instruments should be washed in soap and hot water and have plenty of hot water injected through them, after which

Fig. 90.—End of soft rubber catheter broken off in bladder and passed by the urethra. (Author's series, Vanderbilt Clinic.)

they are boiled in plain water. The surgeon should examine these instruments from time to time, as the rubber, especially about the eye, is liable to become brittle, which condition,

Fig. 91.—Half of silk olivary bougie broken off in the bladder and removed by perineal cystotomy. (Author's service, Bellevue Hospital.)

if not noticed, may result in the breaking-off of the end of the catheter while in the bladder (Fig. 90). Should such an accident occur the patient must be notified of it

at once, and the piece removed, through the operating cystoscope, by means of the author's urethral forceps (Fig. 92); or, this failing, through a small perineal or suprapubic cystotomy incision. They should be laid away straight and not in contact with each other.

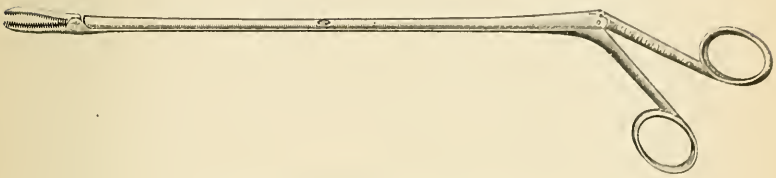


Fig. 92.—Author's urethral forceps.

During the heat of summer soft-rubber and flexible instruments, unless in daily use, should be lightly dusted with French chalk to prevent them from sticking together, which destroys their delicate and highly polished surfaces.

For transportation in a sterile condition these and the silk catheters can be placed in a glass catheter-carrier, (Fig. 93), which, together with the catheters, can be placed in a sterilizer and boiled.

Fig. 93.—Glass catheter-carrier.

Syringes.—The large metal and glass syringes, for bladder and urethral irrigation, can be taken apart, washed and boiled for a few moments.

Cystoscopes. should be carefully washed in soap and water, and their irrigating and catheter channels injected

with alcohol, after which they are rinsed off in sterile water, dried on sterile gauze, and placed in a Schering formalin sterilizer, in which formaldehyde gas is produced from the vaporization of paraform pastils. In place of this they may be laid in solutions of formalin, 2 per cent., or oxycyanide of mercury (1 to 3000) for ten or fifteen minutes before use. In any case they are dipped in a sterile solution of boric acid just before use, to guard against irritation of the mucous membranes by the sterilizing agent. They cannot be boiled on account of the cement around the lenses.

Urethral Catheters.—These little catheters are made of woven silk, and have delicate and highly polished surfaces, which must always be intact. They are washed in soap and hot water, carefully injected, dried on sterile gauze, and then subjected to formaldehyde gas in the sterilizer above mentioned, or boiled for not more than two minutes. Just before use they are dipped in a sterile boric acid solution.

LUBRICANTS.

These substances must be smooth and sterile, and absolutely non-irritating to the urethral and bladder mucous membrane.

If instrumentation is to be followed by urethral or bladder medication, the surgeon must use a lubricant that is soluble in water, otherwise the mucous membrane will be covered with a non-soluble coating, which prevents the medicated fluid from acting upon the urethral walls.

Of the soluble lubricants, that made according to the following formula has proved, in the author's hands, to be the most satisfactory:

℞—Mercury oxycyanide,	gr. v
Gum tragacanth, selected,	ʒij
Glycerin, neutral,	ʒij
Distilled water	ʒxviij

Lubrichondrin, which is a combination of Irish moss, formalin, and eucalyptus, is also a good lubricant for general urethral work.

Glycerin is a fairly good lubricant, provided the instrument be warm, but on cold or even cool metal instruments it runs together and does not give a smooth, uniform coating; it is sticky, and to some mucous membranes extremely irritating.

White vaselin, although a good lubricant, is insoluble in water and so greasy, and difficult to wash off of instruments, the fingers, and genitals, that it is only of service where we want a thick, tenacious coating on instruments and the urethral walls, to protect the mucous membrane from injury, as during the operation of litholapaxy, in which it is the best lubricant we have for lithotrites and tubes. It can be obtained, sterile, in collapsible tubes.

Olive oil, sterilized, is very useful for lubricating and distending the urethra in cases of tight stricture, and before litholapaxy operations; it is warmed and injected with an ordinary hand-syringe.

INSTRUMENTATION.

The following points in technic will be found of much practical value, and should be systematically and carefully carried out in all cases of urethral and bladder exploration, examination, and treatment.

For all cases the examiner's hands and nails should be

cleansed and prepared as for general operative work, sterile gloves being worn if so desired.

In all cases the penis, preputial cavity, and entire glans are washed off with 1 to 1000 bichloride of mercury solution, after which they are dried with sterile gauze.

The patient should always pass his urine just before urethral or bladder exploration or treatment, in order to free the canal of any accumulated secretion.

Whenever possible the patient should be given urotropin, in full doses, for twelve to twenty-four hours before instrumentation, and for a day or two after.

Urethral irrigations before instrumentation should only be employed when the urethra is filled with secretion that cannot be flushed out by the urine, on account of the traumatism and irritation that even they are liable to occasion, and also the fact that fluid thrown into the anterior urethra by catheter or irrigator does not distend the canal sufficiently to efface all of its folds, especially in the bulbous portion, and therefore cannot even cleanse it thoroughly. Warm sterile salt or boric acid solution should be used for these irrigations in preference to solutions of bichloride of mercury, oxycyanide of mercury, nitrate of silver, or permanganate of potash, as any of the latter, if used in sufficient strength to be of real germicidal value, set up more or less urethral congestion and irritation, which condition is just what we should avoid and guard against in these cases.

Be sure that the patient lies squarely and comfortably on his back, with head and shoulders elevated and muscles relaxed.

Surround the penis with sterile towels or sheets to prevent instruments from being contaminated by contact with the patient's body or clothing.

Solid or rigid instruments must never be used, when soft-rubber ones can be employed, on account of the traumatism that may be occasioned by the former.

Perfect instruments, cleaned, warmed, and lubricated as above described, should be passed *so gently, slowly, and skilfully* through the urethra that they do not cause the slightest contusion or abrasion of this delicate, highly vascular, and sensitive mucous membrane, which, when the seat of traumatism, is so liable to give rise to alarming and even fatal conditions.

CHAPTER XVIII.

COMMON AFFECTIONS OF THE GLANS AND PREPUCE.

It is not the aim, in this chapter, to enter into a discussion of all the conditions which may be found affecting the glans penis and prepuce. We shall only take up here three of the most common diseased conditions met with in that region: herpes progenitalis, congenital phimosis and vegetations. Gonorrheal phimosis, paraphimosis, and balanitis have already been described among the complications of acute gonorrhea, and the reader is therefore referred to that chapter for a discussion of them.

HERPES PROGENITALIS.

Herpes progenitalis is an inflammatory affection of varying intensity, which attacks the mucous membrane and integument of the external genital organs.

The vesicles are usually found at the meatus, on the glans, in the sulcus behind the corona, or on the inner surface or free border of the prepuce, and more rarely on the integument of the prepuce, penis, or even pubic region.

It usually occurs in young adults, and is very prone to relapse at irregular intervals.

The affection consists of one or several vesicles, either grouped together or scattered irregularly over the part. At first their content is clear and serous, but it soon becomes

turbid, and eventually dries up into a crust; or the vesicle ruptures, leaving a superficially ulcerated surface corresponding to the size of the original lesion.

If the little ulcer is kept clean it heals quite rapidly and without any complications, but if from neglect or improper treatment it becomes infected or irritated, then the glands in the groin become enlarged and painful, and in some cases go on to suppuration and abscess-formation.

Prior to and during the development of the vesicles there is more or less local pain, burning, smarting, or itching in the parts, which when examined are seen to be inflamed and congested, and the seat of one or more vesicles, which in a short time rupture or dry up and become encrusted.

As a general rule, herpes progenitalis occurs most frequently in neurasthenic subjects, and also in those with strong sexual instincts. Anything causing local congestion, irritation, or inflammation favors its development, as balanitis, from disease or uncleanliness; phimosis, either congenital or acquired; stricture of the urethra, and urethral lesions in general. Sexual and alcoholic excesses, and also the rheumatic and gouty "diathesis," are undoubtedly predisposing causes in some cases.

As a general rule, the diagnosis is readily made from the acute inflammatory nature of the lesion, the antecedent pain, itching, and irritation, and also the fact that the patient has had many similar attacks.

There are some cases, however, in which it is quite difficult, at first, to make a differential diagnosis between the chancroid, the chancrous erosion (initial lesion of syphilis), and simple herpes; therefore the surgeon should not attempt to give a positive opinion in these cases until sufficient time has elapsed for the lesion to assume its typical characteristics.

Examination of smears from the lesion, by dark-field illumination, will also greatly assist in arriving at a diagnosis.

Treatment.—The parts should be kept absolutely clean by frequent immersion and washing in hot water, or better still, hot bichloride of mercury solution (1 to 5000), after which they are carefully dried, and then dusted with boric acid powder or aristol. If a wet dressing is deemed more advisable, we may employ boric acid solution, mild lead-water, or a weak solution of sulphate of zinc ("red wash"), renewing the dressing every few hours.

When, as a result of the above treatment, the parts have resumed their normal condition, the cause of the trouble should be sought and if possible removed. A phimotic prepuce should be circumcised, the glans kept clean, strictures dilated or cut, and urethral lesions properly treated.

Should the inguinal glands become painful during an attack of herpes, the patient must be put to bed and the groin covered with a cold bichloride dressing, which, as a rule, is soon followed by relief. If, on the other hand, suppuration occurs, the resulting abscess must be incised and the pus evacuated, or the pus let out by a small puncture, and the abscess cavity injected with iodoform ointment, for the technic of which the reader is referred to the treatment of chancroidal "bubo" or adenitis.

VEGETATIONS.

Vegetations, or as they are commonly called, warts, are either of the soft or hard variety, depending upon their situation; those found on mucous membranes and at mucocutaneous junctions being soft and moist, while those

arising from the integument around the genital organs are hard, dry, and even corneous.

By some authors these new growths are incorrectly spoken of as "venereal" warts, a misnomer which should never be employed when speaking of them.

Vegetations consist of hypertrophy of the papillæ of the skin or mucous membrane, with a corresponding vascular and connective-tissue increase.

FIG. 94.—Soft vegetations (warts). (Author's case.)

Their origin and growth are due to uncleanliness, heat, moisture, and friction, and not, strictly speaking, to venereal disease or contact.

Soft warts (Figs. 94 and 95) usually occur in young adults, and more rarely in older subjects. They are situated at and within the meatus, on the glans penis, in the coronal sulcus, around the frenum, and on the inner surface of the prepuce. Unless recognized at an early date and properly

treated, they increase in size with great rapidity, involving the surrounding tissues, sometimes covering the entire glans and protruding from the preputial orifice in a cauliflower-like mass. Springing from either a broad and flattened or pedunculated base, they assume various shapes and sizes, according to the conformation of the surrounding parts or structures; their color varies from a deep red, to a pink or even grayish hue, and when in contact with each other or adjacent parts, they give rise to a thin secretion with penetrating and disagreeable odor.

Fig. 95.—Soft vegetations (warts). (Author's case.)

Hard warts (Figs. 96 and 97) are usually encountered in middle-aged and even old subjects, and are situated upon the sheath of the penis, on the scrotum, and also on the integument in general about the external genital organs. They consist of small rounded or pointed masses, of a dirty brown or red color, which increase in size and numbers, but not as rapidly as the soft variety, into which they may be converted if exposed to moisture and friction from irritating discharges and opposing surfaces.

Fully developed soft vegetations are, as a rule, so characteristic that they are readily differentiated from other growths of the penis, although there is a bare possibility of mistaking them for condylomata lata, if a syphilitic history be given. In such cases the Wassermann reaction and examination of smears by the dark field will help in their differentiation.

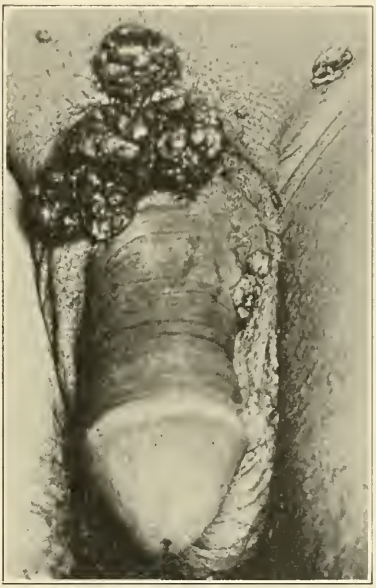


Fig. 96.—Hard vegetations (warts). (Author's case.)

As hard warts are always prone to undergo malignant degeneration, the surgeon should remember this fact, especially in middle-aged and elderly men, and always have an immediate microscopic examination made of the deeper portion of the new growth, which, if found to be malignant in character, should always be promptly and

radically removed, either by amputation or total extirpation of the penis; together with, if indicated, the removal of the inguinal lymph ganglia.

Treatment.—The warts themselves and the surrounding parts are carefully cleansed and surrounded with sterile towels, and then, under local (cocain or novocain) or general anesthesia, all of the vegetations are thoroughly removed with curved scissors, close to the mucous membrane or integument.

FIG. 97.—Hard vegetations (warts). (Author's case)

The parts are then cleansed, lightly wiped with moist sterile gauze, and dressed with dry gauze and any good dusting powder, such as boric acid or aristol. If not too numerous the warts can be fulgurated with the Oudin high-frequency current.

If the warts are situated about the meatus, care must be taken not to cut its lips, as healing of the little wounds will be followed more or less by cicatricial contraction, with a resulting stenosis of this portion of the canal.

Warts in the urethra proper are best removed through a large endoscopic tube, by fulguration with the Oudin high-frequency spark.

If the patient has a long foreskin, circumcision should be performed when the warts are removed, or at a later date if deemed more advisable.

CONGENITAL PHIMOSIS.

Congenital phimosis is caused by such a degree of narrowing of the preputial orifice that the foreskin cannot be retracted beyond the glans; it is frequently complicated by bands or adhesions running between the glans and the inner surface of the prepuce, and may or may not give rise to mild or very severe attacks of balanoposthitis, with painful and annoying manifestations.

Treatment.—The palliative treatment consists in keeping the parts as clean and dry as possible, but circumcision should be strongly advised as the only cure for this condition.

CIRCUMCISION.

The external genitals are shaved and rendered surgically clean in the usual manner, the patient urinating just before the operation, which is done under general or local anesthesia in the following manner: The prepuce is drawn well forward, and a circumcision clamp (Fig. 98) applied in such a manner that its blades are exactly parallel with the corona (Fig. 99);

this gives them an oblique position, as shown in the figure; the foreskin is now ablated with a pair of heavy curved scissors or a straight knife, cutting close to the distal side

Fig. 98.—Circumcision clamp.

of the clamp, which is now removed, when the integument retracts to the coronal sulcus and leaves the external or raw surface of the mucous layer of the prepuce exposed. The clamp is now applied to this layer and the cutting done

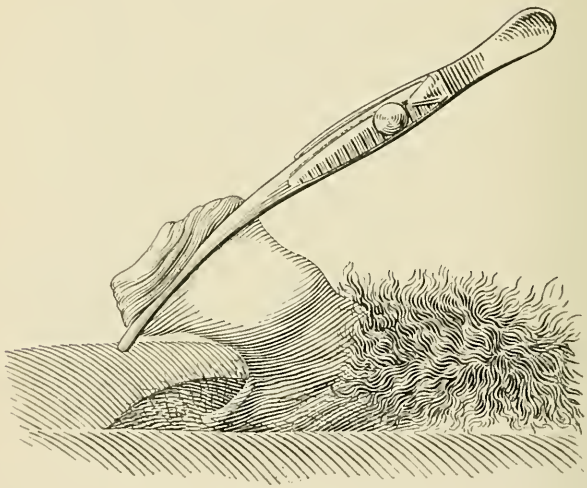


Fig. 99.—Clamp applied to foreskin.

in exactly the same manner as above described, which leaves the frenum intact and also plenty of mucous membrane. Bleeding-points are caught and ligated with fine gut, and

the wound closed with black-silk interrupted sutures placed about one-quarter inch apart. A moist bichloride dressing is then applied, and the patient kept on his back, or very quiet, for a day or so.

If the operation is done under novocain or cocain anesthesia, the solution (0.5 to 1 per cent.) should be injected hypodermically between the two layers of the foreskin after the clamp has been applied, and allowed five to ten minutes to act before cutting is commenced; when the tegumentary layer has been removed, a little of the solution may be dropped on the raw surface of the mucous layer. Local cocainization produced in this manner renders the operation comparatively painless. If the prepuce can be retracted it is well to do so and to wrap the glans and retracted prepuce with gauze soaked in 2 per cent. cocain for a few minutes before applying the clamps. Should retraction be impossible, the preputial cavity may be distended with the solution, injected by means of a hand-syringe. In either case the mucous membrane of the preputial cavity is anesthetized, thus adding greatly to the patient's comfort during the rest of the operation. Patients must be told not to soil the dressing while urinating.

CHAPTER XIX.

THE CHANCROID.

The chancroid, or soft chancre (also called the simple and non-infecting chancre, or the local, contagious ulcer of the genitals), is an acute inflammatory and destructive lesion, whose action is purely local in character and limited to the parts upon which it is situated, and to the lymphatic vessels and glands in anatomical relation with those parts.

Chancroidal infection may be either direct or mediate.

Direct infection is caused by the transferrence of the secretion from the genitals of one person to those of another during coitus or unnatural practises.

Mediate infection is that mode in which the pus is transferred upon any article to a healthy individual, the agents of transfer being surgical instruments, dressings, towels, or the fingers. Although this manner of chancroidal infection is quite rare, it does sometimes occur.

Chancroid of the anus is occasionally met with, the infection being due to unnatural practises or to accidental contamination. The lesion may also be accidentally transferred to other parts of the body.

The chancroid is in reality a form of infected or septic wound or ulcer of the genitals. It is caused by the secretion of a chancroid, a chancroidal adenitis, or lymphangitis. It may also originate from any form of pus containing pyogenic microbes, as is well illustrated in those cases where

men derive chancroids from women, who on careful examination reveal nothing but a purulent discharge, which, entering a hair follicle, chafe, or abrasion on the male genitals, produces a typical chancroid.

Chancroids also originate *de novo* in subjects who have not had sexual relations for many months previous to the appearance of the ulcer; these cases are sometimes followed by suppurative adenitis in either one or both groins. The infecting agent or cause of these chancroids is some form of pyogenic organism, which gains access to the tissues through a ruptured herpetic vesicle, or in fact, any lesion which leaves a raw and absorbing surface. Such instances are frequently met with in patients with long foreskins who suffer from balanitis or herpetic vesicles, which if kept clean promptly heal, but if neglected may become infected and thus converted into typical chancroids, which are sometimes complicated by suppurating inguinal adenitis.

Ducrey describes a rod-shaped bacillus with rounded ends which he always finds in the chancroidal secretions, and claims, therefore, that it is the specific organism in all cases of chancroid. Up to the present time, however, he has not made satisfactory and convincing culture and inoculation experiments, and therefore no absolute conclusions or assertions in regard to the specific nature of the chancroid can be made.

The chancroid has no fixed period of incubation, usually making itself manifest in a day or so after infection, its rapidity of development depending on the resistance of the tissues upon which it is situated; thus chancroids develop much more rapidly on mucous membranes and raw surfaces than they do upon the integument, which offers more obstruction to the invasion of the pyogenic microbes.

The chancroid usually begins as a small pustule, the mucous membrane or integument surrounding which is bright red in color, which is due to the acute inflammatory and destructive nature of the lesion. The pustule soon ruptures, leaving a round or irregular ulcer, with sharply cut edges, undermined walls, "worm-eaten," rough, and yellow floor, which gives rise to a brownish, purulent, and auto-inoculable secretion. There is a varying amount of inflammatory edema or thickening of the tissues around and beneath the sore, which shades off gradually into the surrounding parts, thus differing from the induration of the chancre (initial lesion of syphilis), which is hard, firm, and sharply limited.

The duration of the chancroid varies greatly in different cases and depends upon its extent, situation, and the treatment employed. Chancroids of the meatus are usually followed by more or less cicatricial stenosis of the canal at this point, while those situated on the free edge of the prepuce may lead to phimosis, from cicatricial contraction of the preputial orifice.

Chancroids are most commonly found upon the genital organs of either sex, but may occur on the head, face, and finger, usually from auto-inoculation. They may be situated either on the free border or inner surface of the prepuce, upon the penis, at or within the meatus, on the glans, corona glandis, or in the sulcus behind the glans. When occurring on the scrotum, pubes, thighs, or anus, they are ordinarily due to auto-inoculation. As the result of unnatural practises, we sometimes find chancroids situated at the anus, within the rectum, and on the perineum.

Varieties of Chancroid.—*Follicular or Acneform Chancroid.*—This form of chancroid begins in hair or sebaceous follicles,

and is situated at the junction of integument and mucous membrane. It originates as a small pustule, which is soon converted into a deep, ragged ulcer, whose secretion is very destructive in character.

Ecthymatous Chancroid.—The ecthymatous chancroid is usually found upon those parts of the integument of the genitals which are dry and are not in contact with opposing surfaces. It begins as a little red spot, which is finally converted into a pustule with an area of redness around it; the pustule increases in size and dries up into a blackish-green crust, beneath which is a typical chancroid.

If phagedena attacks a chancroidal ulcer, as it rarely does nowadays, the lesion is then called a phagedenic chancroid. This serious complication occurs in persons who are insufficiently nourished and alcoholic, and in whom the original lesion was vigorously cauterized, and not kept in a cleanly condition.

The infected lesion now has a foul, purulent secretion, a sloughing and gangrenous floor, and is surrounded by edematous tissues, which are purplish-red in color. It destroys the soft parts by extending both in depth and at its periphery.

When a chancroid becomes really phagedenic, the bearer has a brisk rise of temperature, sometimes to 105° F., with a corresponding pulse increase, chilly sensations, or even well-marked chills, which are followed by sweating and a feeling of general malaise and discomfort, with loss of appetite and strength; the above conditions being due to the absorption of septic material from the lesion.

Complications of Chancroid.—*Lymphangitis.*—In chancroid of the penis or prepuce the lymphatic vessels may become enlarged, hot, red in color, and very painful from absorp-

tion of the chancroidal secretions. This inflammation may either subside or go on to suppuration, with the formation of abscesses and chancroidal ulcers along the course of the lymphatic vessels.

Adenitis.—Chancroidal adenitis is caused by the passage of septic material from the sore to the glands in the groin, by means of the lymphatic vessels of the penis.

The glands in either one or both groins become enlarged, matted together, and very painful, while at the same time the skin over them assumes a red and brawny appearance. Suppuration of the glandular mass soon begins and converts it into a large abscess cavity, which, if not incised, ruptures spontaneously, leaving a deep, sloughing pocket, with undermined and broken-down edges, thus constituting a typical chancroidal "bubo."

Different Diagnosis.—The chancroid may be mistaken for many lesions occurring on the penis, the most prominent among them being the hard chancre (initial lesion of syphilis), ruptured herpetic vesicles, abrasions, chafes, fissures, and exulcerated balanitis.

The hard chancre has a definite period of incubation, usually from two to three weeks, and becomes typically indurated, as do the glands in anatomical relation with it; its secretion is serous, and its floor smooth, red, and shining in appearance.

Herpetic vesicles coalesce, and are not, as a rule, so deeply ulcerated as chancroids, unless they become infected. The previous history of the formation of the vesicles associated with local pain and itching is of great aid in making a diagnosis.

In exulcerated balanitis the lesion is large and superficial, with smooth floor, and no undermining of the edges, as occurs in chancroid.

Abrasions, chafes, and fissures, unless ulcerated, are readily recognized, as under appropriate treatment they heal rapidly, and leave no thickening of the tissues upon which they were situated.

In diagnosing any lesion of the penis the physician must always use the greatest care and precaution before giving a positive opinion, as in many cases it takes several days for the lesion to assume its typical appearance. In the meantime these patients are treated locally by bland applications and told to refrain from sexual relations.

The examination of smears from the lesion, by means of the dark-field microscope, will also greatly assist in the diagnosis.

In connection with this it must not be forgotten that at the time the chancroidal inoculation takes place there may also occur infection with the spirochetæ of syphilis. In such a case the ulcer may appear to be a simple chancroid, at first, only to develop later into the initial lesion of syphilis, after the typical longer incubation period of the latter has passed. Under these circumstances, the lesion is spoken of as a "mixed sore."

Prognosis.—The prognosis of chancroid is always favorable, provided the sore can be kept clean, separated from opposing surfaces, and the parts put at rest. Chancroids of the meatus or urethra, and those complicated by a long, tight prepuce, are more difficult to keep clean, and therefore the prognosis as to a speedy cure is not so favorable as when the sore is more readily accessible.

Treatment of the Chancroid and its Complications.—*The Chancroid.—General Treatment.*—Patients suffering from chancroid must be kept as quiet as possible, and told to abstain from alcohol and sexual relations.

The treatment of the lesion depends somewhat upon its situation, the important points being to keep it absolutely clean, free from all irritation, separated from healthy tissues, and never to cauterize it.

The ulcer and surrounding parts should be thoroughly irrigated or washed in hot bichloride of mercury solution (1 to 3000), morning and evening, or more frequently if possible, and dried, the lesion itself being kept covered with wet dressings of zinc sulphate, lead subacetate, aluminum acetate, or bichloride of mercury solution (1 to 3000 to 1 to 5000), which should be renewed every few hours.

All the dressings used upon or about the sore must be destroyed as soon as removed, and the patient told to wash his hands, very carefully, immediately after the dressing is completed.

In all cases cauterization is absolutely unnecessary and even harmful, and should therefore never be employed.

If, however, in spite of cleanliness and proper local treatment, the lesion extends and threatens the destruction of the surrounding parts, as it very rarely, if ever, does, then we may be compelled to resort to applications of tincture of iodin by means of swabs of absorbent cotton wrapped on a small wooden applicator. Care must be taken to apply the tincture of iodin to the floor of the lesion and its undermined walls and edges, but not to the surrounding healthy tissues. A cold bichloride dressing is then applied to allay the pain and inflammation following this application, and the patient told to keep very quiet.

Chancroids of the fossa navicularis require the following special treatment: The patient having urinated, the prepuce is retracted and the parts washed with bichloride solution. A small soft-rubber catheter, properly lubricated, is then

passed up the urethra beyond the lesions, and hot boric acid solution is injected by means of a large hand-syringe or irrigator. In this manner the canal is washed out from behind forward, the solution escaping at the meatus. This procedure should be repeated three or four times a day. Should the lesion prove resistant, we may supplement these irrigations by the application of solutions of zinc sulphate or alum (1 or 2 per cent.), or of tincture of iodin, applied through an endoscopic tube, by means of absorbent cotton swabs.

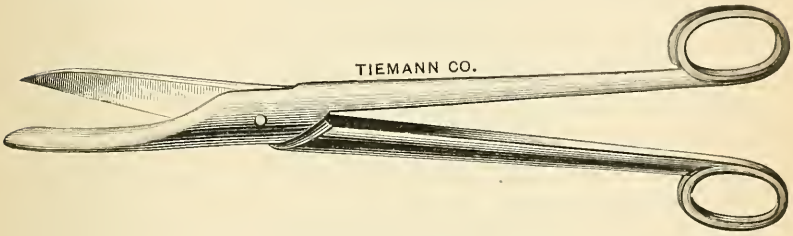


FIG. 100.—Phimosis scissors. (Taylor.)

Chancroids situated beneath a long, tight prepuce, which cannot be retracted, require frequent subpreputial injections or irrigations of hot bichloride of mercury solution. A better plan, however, is to make two lateral incisions through the foreskin and expose the parts for inspection and local treatment, thus preventing sloughing, with more or less destruction of the glans and surrounding tissues. This operation is performed in the following manner:

The patient having been anesthetized, the parts are shaved and rendered surgically clean in the usual manner, and with heavy phimosis scissors (Fig. 100) or a scalpel and grooved director, a lateral cut is made through each side of

the prepuce from its free edge, well down into the coronal sulcus, thus forming an upper and lower flap, which, when retracted, expose the entire glans penis and the inner surface of the foreskin (Fig. 101), which is not the case when the dorsal incision is made. The parts are kept constantly

FIG. 101.—Lateral incisions. (Papier maché model by Dr. Reynolds.)

irrigated during the operation with hot bichloride solution. The chancroids are then treated as already described, and the raw edges of the wounds protected from infection by frequent dressings and irrigations with very hot bichloride solution. The hemorrhage, which is quite free, is readily

controlled by the pressure of the dressing. By a simple plastic operation the flaps may be trimmed off, if necessary, and the edges sutured, at a later date, when the infection has subsided and the wounds have healed.

Adenitis.—If during the course of chancroids the inguinal glands become enlarged and painful, the patient should be kept very quiet or put to bed. A cold, wet bichloride or aluminum acetate dressing is often followed by favorable results in this condition. Dressings of 20 per cent. ichthyol or of compound iodin ointment are also useful in some cases. If in spite of the treatment above given the glands fuse together, break down, and suppurate, thus forming an abscess, they must be promptly treated either by evacuation of the pus and injection of iodoform ointment, or by free incision with removal of the infected glands.

First Method.—This method, which was advocated by Helm, and which I have somewhat modified, should be tried in all suitable cases of suppurative adenitis, as it leaves no scar, nor is it necessary for the patient to take an anesthetic, remain in bed, or be subjected to a more or less painful and tedious convalescence. The steps in the procedure are as follows:

1. The operative field and genitals are shaved and rendered surgically clean in the usual manner and the penis bandaged with sterile gauze.

2. A few drops of a 1 per cent. solution of cocain or novocain are injected beneath the skin where the puncture is to be made.

3. A straight, sharp-pointed bistoury is then thrust well into the most prominent part of the tumor until pus flows.

4. All of the pus is forced out through this opening by firm but gentle pressure, as this procedure is, as a rule, painful.

5. The abscess cavity is irrigated with peroxide of hydrogen until the return is practically clear.

6. It is then irrigated with a 1 to 5000 bichloride of mercury or salt solution, all of which is carefully squeezed out.

7. The now thoroughly cleansed abscess cavity is completely filled, but not painfully distended, with 10 per cent. iodoform ointment, by means of an ordinary conical glass syringe previously warmed in hot water.

8. A cold, wet bichloride dressing is applied with a fairly firm spica bandage, the cold congealing the ointment at the wound and thus preventing its escape into the dressing.

The patient should be kept very quiet for the first twenty-four to forty-eight hours, rest in bed being preferable, although not absolutely necessary.

The dressing is removed at the end of the third or fourth day and the parts examined. If pus has reaccumulated, a second injection may be made. If, on the other hand, all looks well, the first dressing is replaced by a gauze pad and spica bandage, and the patient told to report in two or three days for examination.

In order to secure the most favorable results from this method, it should only be employed when the glands are thoroughly broken down, fluctuation well marked, and the integument thinned over the most prominent part of the tumor so that the iodoform may come in direct contact with all of the infected tissues. If, after one, two, or even three injections, this method fails to produce the desired result, an incision may then be made and the contents of the abscess removed, the previous treatment not having interfered in any way with this operation.

Second Method.—The patient having been anesthetized and prepared as usual, a long incision is then made over the most

prominent part of the mass and parallel with the inguinal fold, thus exposing the broken-down, suppurating, and infected glands, which must be thoroughly removed, great care being exercised not to wound the femoral vessels or their branches. Bleeding-points are caught and ligated, and the abscess cavity thoroughly irrigated with peroxide of

FIG. 102.—Chronic edema of penis and scrotum following complete extirpation of the right inguinal glands. (Author's case.)

hydrogen and hot bichloride of mercury solution (1 to 2000). The now clean and dry wound is packed with moist sterile gauze, over which is placed the usual sterilized gauze and cotton dressing, which is held in position by a firm spica bandage. No attempt at suturing should be made in these cases on account of the inflamed and infiltrated condition

of the tissues, which, if left free to drain, will, under the proper treatment, granulate quite rapidly from the bottom, and not be followed by sinuses, as is so frequently the case when the wound has been sutured, and primary union obtained at only a few points.

In severe cases, where the pus has burrowed downward to the thigh and up on the abdominal wall, it is well to combine a vertical with the transverse incision for purpose of better and freer drainage.

It must not be forgotten that the too radical removal of the inguinal lymphatics is sometimes followed by edema of the lower extremity, or the penis and scrotum, which is severe in character, chronic in course, and very rebellious to treatment (Fig. 102).

CHAPTER XX.

SYPHILIS.

Syphilis is a chronic, infectious, and constitutional disease, always beginning in a local lesion called the initial lesion or chancre, which, in acquired syphilis, invariably marks the point of entry of the syphilitic virus (or spirocheta). Entering the system by means of the blood-vessels, lymphatics, and perivascular lymph spaces, it attacks primarily the connective tissue, and in its course may affect every tissue and organ in the body.

The disease is characterized by an increase of the connective-tissue cells and by the development of a new tissue, called granulation or gummatous tissue, composed of small round cells resembling somewhat white blood corpuscles, in which are found the spirochetæ in varying numbers.

Etiology.—The microörganism which is the cause of the disease is a flagellate protozoön discovered in 1905 by Schaudinn, and named by him the Spirocheta pallida (Treponema pallidum) (Fig. 103). It is found in all the lesions of the disease, including general paresis and tabes dorsalis, though its detection in these last is so very difficult that it has only recently been accomplished. The spirocheta varies from 4 to 14 mmm. in length, with a breadth of from $\frac{1}{4}$ to $\frac{1}{2}$ mmm. The number of turns of the spiral is from 8 to 26, the turns being narrow and corkscrew-like. The organisms may be found in smears stained by Giemsa's stain; the

examination of the infected secretion by dark-field illumination (the best method), and by flooding the smear with Chinese ink, when they will appear as bright spirals shining against a dark background, provided too much ink is not

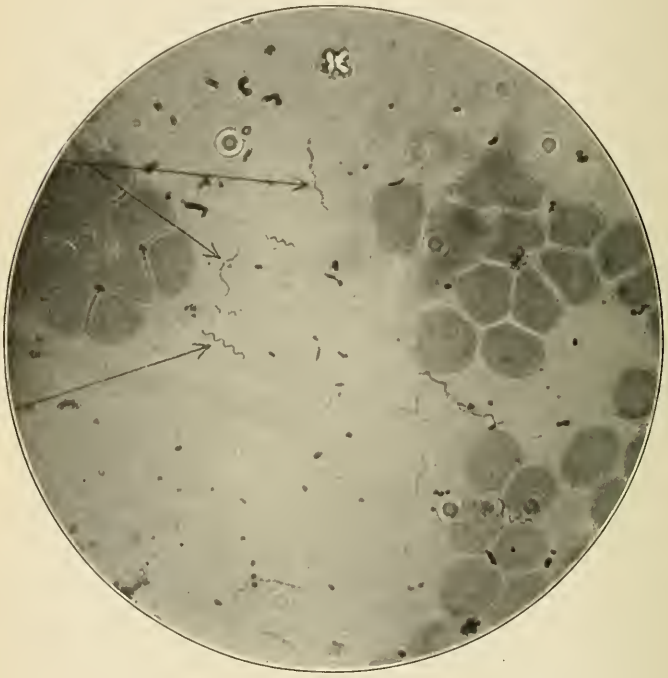


FIG. 103.—Spirocheta pallida and Spirocheta refringens.

used. The smears should not be made from the surface secretion of the lesion but from the exudation obtained by gently scraping the ulcer until a colorless serum exudes. For further details the reader is referred to the standard works on bacteriology.

There are two forms of syphilis: the acquired form and the hereditary form; both are due to the same organism, but differ in their course and manifestations.

Acquired syphilis is communicated by a syphilitic person to one free from the disease, the point of inoculation being always marked by the initial lesion or chancre.

Hereditary syphilis is transmitted *in utero* from either one or both parents, and in this form there is no initial lesion; the onset of the disease being marked by general manifestations.

As a general rule, syphilis occurs but once in the same individual, although reinfection may take place both in the acquired and the hereditary forms, as a number of cases have been reported in which reinfection has occurred after treatment, with mercury and salvarsan, of the initial attack.

The course of syphilis is best divided into three stages: the primary, the secondary, and the tertiary; but it must not be forgotten that in a certain number of cases tertiary lesions may occur in the secondary stage, or *vice versa*, or that lesions of these different stages may be present at the same time, thus showing that the disease does not invariably follow these sharply defined periods.

Primary Stage.—The primary stage of syphilis consists of two periods of incubation. The first period of incubation exists from the time of infection to the appearance of the initial lesion, and, as a rule, lasts from fourteen to twenty-one days; but may be as short as ten or as long as seventy days. This is immediately followed by the second period of incubation, which dates from the formation of the initial lesion to the development of constitutional manifestations, and usually occupies forty to forty-five days, but may be prolonged to sixty, seventy, or even ninety days.

These two periods of incubation make up the primary stage of syphilis, the duration of which is from fifty to eighty days.

The lesions of the primary stage are the initial lesion, or chancre, and the glandular and lymphatic indurations in anatomical relation with it, these glands and vessels becoming indurated from about the seventh to the tenth or fourteenth day.

Secondary Stage.—The secondary stage of syphilis, or the stage of constitutionl manifestations, now begins, and is characterized by superficial lesions of the skin and mucous membranes, as well as their appendages, and by affections of the eyes, and enlargement of the superficial and deep lymphatic ganglia throughout the entire body, which enlargement usually commences quite early in the secondary period of incubation. The duration of this stage is variable, usually lasting from one to two years, and depending greatly upon the treatment, the habits, and the constitution of the patient.

Tertiary Stage.—The tertiary stage usually begins at about the end of the second year, but is not so frequently observed now as formerly, owing to improved methods of treatment. It manifests itself by gummatous, tubercular, bullous, and ulcerative lesions, also by affections of the nervous and vascular systems, the viscera, and bones.

Contagion.—The secretion of the initial lesion is highly contagious. The secretions of the secondary lesions (mucous patches, condylomata, etc.), and the blood and lymph, in the secondary stage, are also contagious. The physiological secretions, such as the tears, milk, saliva, and sweat, may be considered innocuous, unless mixed with blood or secretions from primary and secondary lesions, which in turn render them contagious. The semen is innocuous upon a

cutaneous or mucous surface, but may transmit syphilis to the ovum. The urine is in all probability also innocuous.

The secretions of the tertiary lesions are also contagious, as the spirochetæ are found in them, although only in small numbers and probably of much diminished virulence.

Infection.—Syphilitic infection may be either direct or mediate.

Direct infection takes place most frequently from the genitals of one person to those of another during coitus, also in unnatural sexual practises in depraved individuals.

Mouth-to-mouth infection, as in kissing, is not infrequent.

Surgeons, physicians, dentists, and nurses are very liable to infection on the fingers and hands, and should therefore exercise great care in handling or operating upon syphilitic subjects.

Mediate infection is that form in which the syphilitic secretion is deposited upon any article, and then transferred from it to a healthy person. The agents of transfer may be cigars, pipes, tooth-brushes, pencils, chewing-gum, handkerchiefs, whistles, drinking and eating utensils, razors, towels, toys, plasters, postage stamps, surgical operations—dressings, instruments, etc. Glass-blowers may be infected, as a number of men use the same pipe. Vaccinosyphilis is very rarely encountered at present, owing to the substitution of bovine for human virus.

When the disease is contracted in any of the above ways—that is, without sexual contact—it is called *syphilis insontium*, syphilis of the innocents, or unmerited syphilis. Syphilis is precisely the same disease, and pursues the same course, whether derived from the secretion of a primary, secondary, or tertiary lesion, in any case the point of entry of the syphilitic virus being marked by the initial lesion or chancre.

Prognosis.—As a general rule, it may safely be stated that patients who are otherwise in a perfectly healthy condition experience very little trouble from syphilis, provided they have the proper form of constitutional and local treatment for a sufficient length of time, and live moderate, temperate, and regular lives, according to the rules laid down by the physician. It is usually thought that blondes and subjects with light complexion and reddish-brown or red hair are prone to suffer more than those of dark complexion. The disease is apt to be very severe in old age, and in nervous, excitable, and neurasthenic subjects. Alcoholic habits, drug addictions, and intercurrent diseases, especially Bright's disease, diabetes, cancer, and tuberculosis, render the prognosis much less favorable. Syphilis sometimes runs a very severe course in fat and flabby subjects, also in very thin and anemic ones with poor muscular and chest development.

A guarded prognosis must always be made in poorly and insufficiently nourished subjects, and also in those whose vitality and resistance have been lowered by disease, bad habits, worry, care, grief, etc.

As a general rule, women do just as nicely and withstand the disease as well as men, provided they adhere to a proper and sufficient course of treatment.

There are undoubtedly very rare instances in which the disease tends to self-limitation, but one cannot prognosticate with accuracy which case will do well and which one badly; the physician must therefore be very guarded in giving his opinion, always taking into consideration the habits and general condition and make-up of his patient, who should always be plainly and emphatically informed that the loyalty and common-sense with which he carries out minutely all

of the details of treatment are most important factors in his cure, as the physician alone cannot accomplish all.

It must be remembered that with our improved methods of treatment (salvarsan and neosalvarsan) the prognosis is much more favorable, in the vast majority of cases, than it formerly was.

CHAPTER XXI.

THE INITIAL LESION.

The initial lesion of syphilis is also called the chancre; the hard, or Hunterian chancre; the initial sclerosis; the primitive or initial neoplasm and primary syphilitic ulcer.

Fig. 104.—Chancre of lip. (Author's case.)

It originates from syphilitic blood, or from the secretions of primary, secondary or tertiary lesions, appears at the end of the first period of incubation (fourteen to twenty-one days), and is always situated at the point of entrance of the Spirocheta pallida.

Usually there is but one initial lesion, although several may be present at the same time, infection having occurred simultaneously at several points.

Seat of Chancre.—Chancres found upon the genital organs are called *genital chancres;* while those situated elsewhere upon the body are designated as *extragenital chancres.*

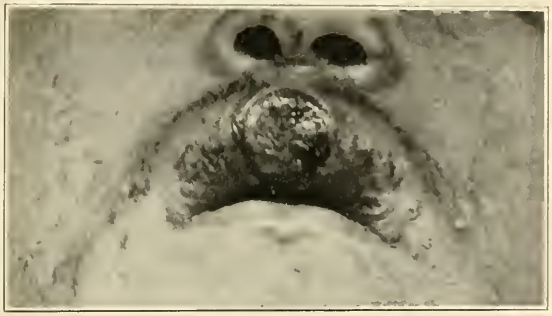


Fig. 105.—Chancre of upper lip. (Author's case.)

Most frequently the initial lesion occurs upon the genitals, but it may be situated anywhere upon the body—as the lips

Fig. 106.—Chancre of lip. (Author's case.)

(Figs. 104, 105, and 106), the tongue (Fig. 107), the tonsils (Fig. 108), the eyelid or conjunctiva, the ear, the forehead,

the face, the neck, the fingers, the pubes, the belly, the breasts, the arms, the thighs, the hands, the anus, or within the rectum.

FIG. 107.—Chancre of tongue. (Author's case.)

FIG. 108.—Chancre of tonsil. (Author's case.)

In looking for the site of the initial lesion in obscure cases it is well to bear in mind the clinical fact that the lymphatic glands in anatomical relation with the lesion are always the largest and most indurated.

There is nothing absolutely characteristic in the appearance of the initial lesion in its very early stages. Most commonly it begins as a small erosion from which exudes a variable amount of serous secretion; but it may first appear as a small, dry papule, or closely resemble a ruptured herpetic vesicle, or as a small, white, silvery spot, or purple necrotic nodule. Whatever the form first assumed, however, the chancre finally develops into a superficial erosion, with purplish zone, sloping sides, smooth, red, shining floor, and profuse serous secretion, situated upon and surrounded by a circumscribed mass of induration.

Infecting Balanoposthitis.—This is a form under which the initial lesion sometimes appears, and may be mistaken for simple balanoposthitis, so that we should always be very guarded in making a positive diagnosis in these cases. The prepuce is infiltrated, its mucous membrane thickened, purplish-red in color, and slightly excoriated. The glans penis may or may not be eroded. In some cases the induration is localized, in others it is evenly distributed, causing phimosis from thickening and hardening of the prepuce.

The induration of the chancre is a cartilaginous hardness of the tissues around and beneath the lesion, and is not really typical until about the seventh or fourteenth day after the appearance of the chancre. It is due to a deposit of granulation tissue, which takes place without acute inflammation, and which is sharply defined at its circumference from the surrounding structures. The amount of induration varies, and depends greatly upon the site of the chancre; it is always

well marked in the sulcus behind the corona glandis, at and within the meatus, or on the corona, but is absent or very slight indeed on the glans penis itself. As a rule, the induration remains until the chancre has healed, although its duration is entirely dependent upon appropriate local and constitutional treatment.

Parchment induration is that variety of induration in which the deposit is superficial and confined to the tissues directly beneath the lesion.

Relapsing Induration.—At any time during the course of syphilis indurated nodules may appear on the genitals, usually upon the site of the original lesion; they are either superficial or deep, and may be mistaken for primary lesions, especially when their surfaces become eroded and give rise to secretions. These nodules have been observed as early as the first and as late as the tenth year of the disease in treated cases.

The secretion of the chancre is profuse and serous in character unless the sore has been irritated or infected, when it is rendered purulent; but even then the pus has a peculiar watery or shiny look, due to the admixture of serum, and this must always be taken into consideration when making a diagnosis. When infection of the lesion does occur the differentiation from a "soft" chancre is often difficult, as pointed out before, in the chapter on Chancroid, when speaking of the so-called "mixed sore."

The duration of the chancre varies in different cases and depends entirely upon the treatment. It may remain until after the development of secondary symptoms, but this should never occur provided the lesion has had proper treatment from its incipiency.

As a general rule, the site of the initial lesion is not marked

by a cicatrix, but by a purplish spot, which in time fades to white. If, however, the chancre was infected and suppurating, then there may be more or less of a depression or scar left as a result of the local tissue destruction.

The diagnosis should be made on the period of incubation, the induration about the ulcer, the smooth, shining surface, with profuse, serous discharge, when the lesion is not the seat of a mixed infection, and the discovery of the Spirocheta pallida, in smears from the ulcer, by dark-field examination. The Wassermann reaction is also useful, after the lesion has existed for some time, but is very rarely positive before the end of the second week, and often remains negative for a much longer period.

Treatment of the Chancre.—The most thorough cauterization, or even the complete excision of the initial lesion, with the lymphatic glands and vessels in anatomical relation with it, even if performed at the time of its appearance, is of no avail in aborting syphilis, as the spirocheta travels so rapidly, by way of the bloodvessels and perivascular lymph spaces, that very distant and remote parts are infected by the time the chancre appears. For this reason, therefore, which has been demonstrated both clinically and microscopically, excision and cauterization of the chancre as abortive measures should never be performed.

The local treatment consists in scrupulous cleanliness of the lesion and its protection from all sources of irritation and infection. The patient must be told to abstain from sexual relations, and to exercise the greatest care and precaution in order to guard against and prevent the infection of others. The lesion should be washed with bichloride of mercury solution (1 to 3000) morning and evening, or oftener, and covered with absorbent cotton saturated in this solution;

this dressing is changed every few hours, the soiled one being destroyed immediately, and the patient told to wash his hands.

Dilute "black wash" is sometimes very serviceable when there is a tendency to the formation of a superficial slough.

Calomel, or equal parts of calomel and boric acid, may also be used as a dusting powder. As a general rule, however, the best dressing for the chancre is absorbent cotton kept saturated with bichloride solution and changed at frequent intervals, as dusting powders have a tendency to form crusts over the lesion and interfere with cleanliness and healing, and with proper inspection of the ulcer.

Chancre situated beneath a long, tight foreskin that cannot be retracted (phimosis), from beneath which exudes a foul, purulent or seropurulent discharge, and that fails to respond promptly to the general, constitutional treatment to be described later, should always be exposed by making two lateral incisions through the prepuce, for which operation the reader is referred to the chapter on Chancroid.

When the chancre is cicatrized the remaining mass of induration should be kept constantly covered with 50 per cent. mercurial ointment, which in a short time will cause it to soften and disappear, leaving a purple spot, which in time fades to white. The ointment should be changed morning and evening to prevent its decomposition, with consequent irritation of the parts.

Adenitis.—The lymphatic glands in the immediate neighborhood of the chancre become indurated on about the seventh to the fourteenth day of its existence; they are painless, freely movable upon and separate from each other, and do not suppurate unless the sore has been infected with pyogenic microbes. The overlying skin remains normal in all respects.

The following table shows the situation of the enlarged glands in relation to the chancre:

Chancres of the genital organs; of the integument in their immediate neighborhood, or of the anus.	Inguinal glands.
Chancres of the lips and chin.	Submaxillary glands.
Chancres of the tongue.	Subhyoid glands.
Chancres of the eyelids.	Preauricular glands.
Chancres of the fingers.	Epitrochlear and axillary glands.
Chancres of the arm and breast.	Axillary glands.

Lymphangitis.—The lymphatic vessels become indurated about the same time as the chancre and run from it toward the nearest group of glands. They are hard and cord-like, and devoid of all acute inflammatory symptoms, provided the chancre is kept clean; but if not, then suppuration may occur along their course.

Differential Diagnosis of the Chancre and Chancroid.

Chancre.	*Chancroid.*
Has a period of incubation; ten days to three weeks.	Has no period of incubation.
Looks like a superficial erosion.	Is "punched out" and excavated in appearance.
The edges are sloping.	The edges are undermined.
The floor is smooth, shining, and red in color.	The floor is uneven, "worm-eaten," and yellow in color.
The secretion is serous and profuse.	The secretion is purulent and auto-inoculable.
The induration is cartilaginous and sharply limited.	There is no induration, but the sore may be surrounded by a zone of edematous infiltration, not sharply limited.
The neighboring lymphatic glands are indurated, painless, freely movable beneath the skin, not matted together, and do not suppurate unless infection of the chancre has occurred.	If the neighboring lymphatic glands are involved, they form an inflamed, painful mass, which usually suppurates; the overlying skin becomes red, tender, and hot.
The tissues around the lesion are purplish in color from venous congestion.	The tissues around the lesion are bright red in color from acute inflammation.
Spirochetæ are found in the discharge.	No spirochetæ are found in smears.

CHAPTER XXII.

THE SECONDARY PERIOD.

In some subjects the commencement of this period, which begins at about the end of the forty-fifth to the ninetieth day, is marked only by lesions of the integument and mucous membranes and general involvement of both the superficial and deep lymphatic ganglia. In others, there are also various constitutional disturbances, such as fever, headache, neuralgia, pains in the bones, muscles, or joints, insomnia, and anemia.

Syphilitic fever varies considerably in different cases, running from 101° to 102°, or even as high as 105° F. It may be either intermittent, remittent, or continuous in character; as a rule, it is higher at night and just prior to the appearance of an eruption, after the development of which it usually subsides spontaneously, or as the result of treatment. The fever may be accompanied by chilly sensations, or even a well-marked chill, and followed by mild or profuse sweating; there is a corresponding acceleration of the pulse and respiration. Syphilitic fever is uninfluenced by quinin and other antipyretics, but yields readily to constitutional antisyphilitic treatment.

Neuralgic pains in different parts of the body, intense headache, and pains in the bones, joints, tendons, and muscles, which become worse at night, are very common at this period of the disease, especially in those who have previously suffered from similar non-specific affections.

Insomnia, accompanied by various delusions, is sometimes met with.

Anemia during this stage is frequently encountered, generally in run-down and debilitated subjects. There is a moderate leukocytosis.

The skin and mucous membranes are very susceptible to irritation and inflammation, as may frequently be observed in the slow healing of wounds and scratches, in untreated syphilitic subjects.

Syphilitic disturbances of sensation occur in both men and women, but most frequently in the latter sex. In some cases anesthesia extends over the entire body, while in others it is restricted to certain regions, its favorite localities being the dorsal surfaces of the forearms, the hands, the ankles, and the feet.

Icterus is sometimes observed during the secondary stage, and is caused by congestion and edema of the mucous membrane of the common bile duct.

THE SYPHILIDES.

The syphilides constitute the various lesions of the skin and mucous membranes which may appear at any time during the course of the disease, in improperly treated cases, and are caused by a localized hyperemia and a varying amount of cell-infiltration. The hyperemic or erythematous syphilides are peculiar to the early stages, while those due to cell-infiltration appear later. The infiltrating cells are small, round, granular, nucleated bodies, resembling somewhat white blood corpuscles, and very similar to the cells found in the initial lesion and the later gummatous tumors.

The course of the syphilides is chronic, and marked by the absence of acute inflammatory symptoms. As a rule, there is no pain or itching except when the lesions degenerate or are situated on the scalp, when they may then cause more or less irritation.

Sometimes several varieties of lesions are present at the same time; this occurrence is due to faulty treatment. Their color, which is at first pinkish red, finally fades to a brownish red or copper color; these pigmentary changes being due to a deposit of the coloring matter of the blood in the affected spots.

In the following descriptions of the various syphilitic eruptions involving the skin and mucous membranes, the reader must bear in mind and clearly understand that, as a general rule, the roseola or macular syphilide is the first and only eruption commonly seen in otherwise healthy subjects who undergo a proper treatment, and that papules, pustules, gummatous infiltrations, etc., are, in reality, due to tardy, improper and insufficient treatment, or to some intercurrent disease, habit, or condition which undermines the patient's health and vitality, thus rendering his tissues more vulnerable to the action of the spirochetæ.

It must also be remembered that, with our modern methods of early diagnosis and more rapidly efficient treatment, not even the macular syphilide or roseola will appear, in the vast majority of cases, provided the patient is seen early enough in the disease.

The Erythematous Syphilide.—The erythematous syphilide, also called syphilitic erythema, syphilitic roseola, or macular syphilide, is the first eruption to appear, and marks the commencement of the secondary period of the disease (forty-fifth to the ninetieth day). It exists in all

untreated cases of syphilis, but may be so faint and scanty in some as to escape observation.

The lesion consists of round, oval, or irregular spots of hyperemia with a diameter of from one line to half an inch. Their color varies from a delicate pink to a decided red or even purple hue. In some cases there is only a mottling of the skin, or the eruption is so faint as to be invisible except

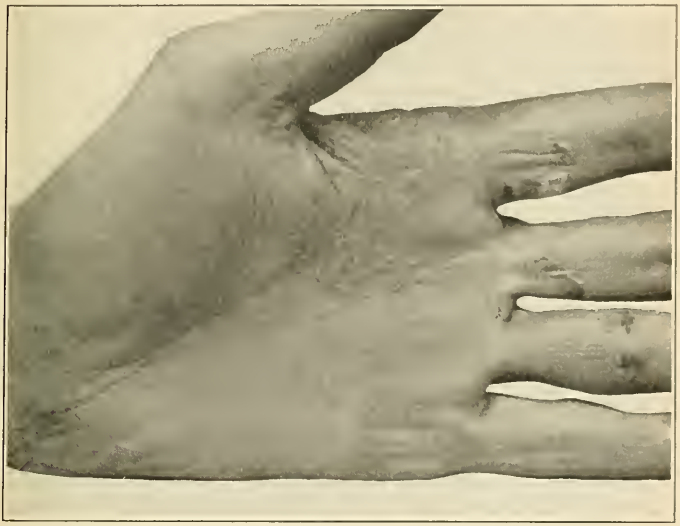


Fig. 109.—Diffuse scaling erythematous syphilide. (Author's case.)

on careful examination. Exposure to cold brings the spots prominently into view, which can be accomplished by applying alcohol to the surface or having the patient undress in a cool room.

As a rule, the eruption appears first near the umbilicus, then spreads over the trunk and extremities, especially on their flexor aspects; the dorsal surfaces of the hands and

feet are rarely invaded, but the spots are very persistent on the palms and soles, where they may form scaling patches (Fig. 109). On the back the eruption follows the obliquity of the ribs, from the median line outward. When it occurs on the scalp it is usually accompanied by alopecia. On the

Fig. 110.—Condylomata lata.

genitals of either sex the macules may hypertrophy, and thus form condylomata lata; the same is true if they are situated about the anus, the umbilicus, the nose, the mouth, or in the folds beneath and between the breasts, or where surfaces of skin are in contact (Fig. 110). If the face be involved,

the eruption is most marked about the nose, mouth, chin, and especially on the forehead, at the border of the scalp.

The eruption on the face is generally covered by fine scales of epidermis or yellowish-white crusts.

The Papular Syphilides.—The lesion of the papular syphilides consists of circumscribed cell-infiltration into the integument.

There are two varieties of the papular syphilide: the conical or miliary papular syphilide, and the lenticular or flat papular syphilide.

The Conical or Miliary Papular Syphilide.—This syphilide has two varieties: the large conical or miliary papular syphilide, composed of large papules, and the small conical or miliary syphilide, composed of small papules.

The *large miliary papular syphilide* is less common than the small variety, and is frequently associated with it. The papules are conical, red in color at first, but finally assume a coppery hue. They rarely appear in large numbers, and are generally scattered over the body. The papules are most profuse on the back and buttocks, the front of the thighs, the face, and the back of the neck. If untreated they are very prone to pustulate and degenerate into ulcers.

In the *small miliary papular syphilide* the papules are about the size of a pinhead, round or conical, sometimes umbilicated, and of a deep pinkish-red color. They are grouped either in the form of circles, segments of circles, or like the letter S or figure 8.

The eruption begins about the face, and thence invades the entire body. Some of the papules may be converted into vesicles or pustules by the formation of serum or pus on their apices.

The Lenticular or Flat Papular Syphilide.—There are two varieties of this syphilide: the small lenticular or flat papular syphilide, composed of small papules, and the large lenticular or flat papular syphilide, composed of large papules.

Small Lenticular or Flat Papular Syphilide.—In this form the papules begin as little red spots, and rapidly increase in size to one-eighth or even one-quarter of an inch in diameter. They are round or oval, with flat surfaces and sharply limited margins. The papules first appear about the shoulders, the back of the neck, or the sides of the thorax, and are rapidly followed by others on the face and the front of the neck; the trunk and body generally are then invaded, and on the back the eruption follows the course of the ribs. They are especially numerous on the flexor aspects of the extremities and near joints. The supra- and infraclavicular regions are not invaded. They are more numerous on the palmar than on the dorsal surfaces of the hands.

If the papules extend below the knees they are sparingly distributed on the inner surfaces of the legs, and sometimes on the soles. This syphilide frequently spares the face, but not invariably.

The scales on the papules are small, adherent, and yellowish white in color. Under proper constitutional treatment this eruption disappears rapidly.

A relapse of this syphilide may occur at any time, in improperly treated cases, and the papules then tend to form circles, or segments of circles, on the elbows and knees, and may be accompanied by papules on the shoulders and trunk.

Large Lenticular or Flat Papular Syphilide.—Commencing as small spots, the papules increase rapidly in size; they are elevated, sharply defined, and covered with small scales; in diameter they vary from three-eighths of an inch to one inch

(Figs. 111, 112, and 113). The color, which is at first red, soon becomes coppery. Their course is chronic, unless checked by appropriate treatment. This syphilide really

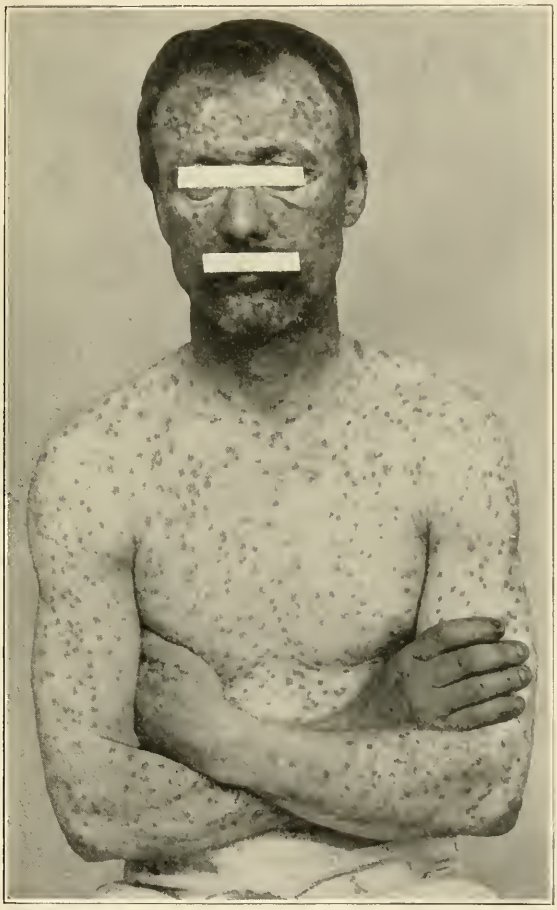


Fig. 111.—Maculopapular syphilide. (Author's case.)

belongs to the middle and late periods of the secondary stage.

The eruption consists of a large number of papules scattered irregularly over the body. Upon moist, warm, and

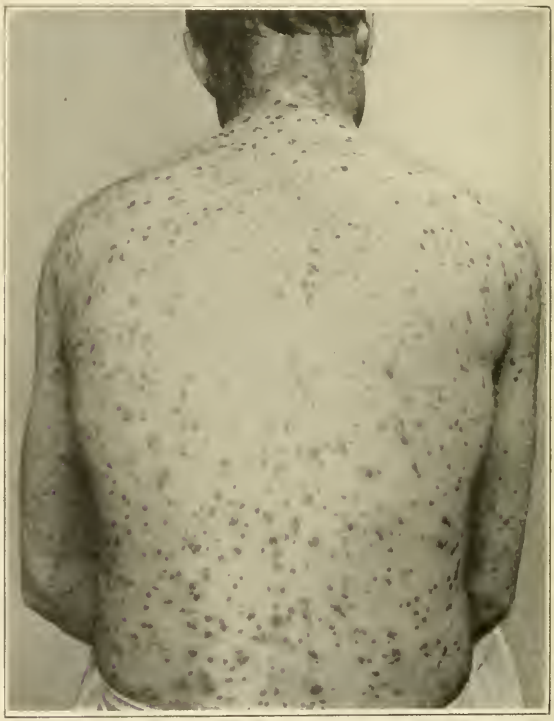


Fig. 112.—Maculopapular syphilide. (Author's case.)

unclean surfaces papules, either large or small, become excoriated and transformed into condylomata lata, with a foul and infectious secretion. This occurs most frequently between the toes, around the umbilicus, at the margin of the

nostril, on the perineum, about the genitals, and between the thighs and scrotum.

Scaling Papular Syphilide of the Palms and Soles. Scaling papular syphilide of the palms and soles may occur at any time during the secondary period or with tertiary lesions.

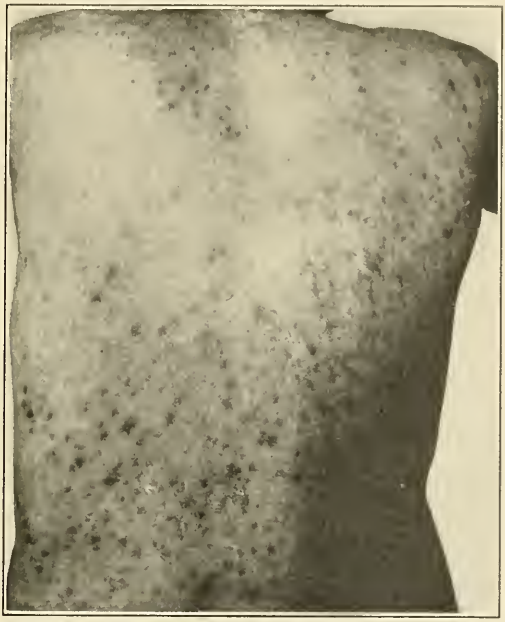


FIG. 113.—Maculopapular syphilide. (Author's case.)

Their course is chronic, painless, and unaccompanied by itching. The well-marked scaling syphilide of the palms and soles may appear as early as the third month or much later. At first the papules are elevated, sharply defined, and of a deep red color; they increase in size, fuse together, and form irregular spots and patches (see Figs. 114, 115, 116, and 117).

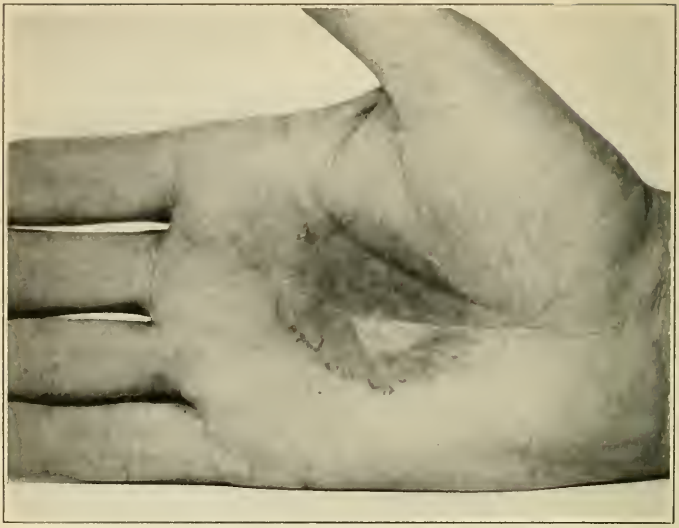


FIG. 114.—Circumscribed scaling papular syphilide. (Author's case.)

FIG. 115.—Diffuse scaling papular syphilide. (Author's case.)

FIG. 116.—Circumscribed scaling papular syphilide of sole.

FIG. 117.—Scaling papular syphilide.

There is a general thickening of the epidermis, with scaling and redness of the surface; in severe cases the furrows of the hand may be converted into painful fissures, which are liable to last for months or even years, in improperly treated cases. This affection may extend along the fingers to the nails, which then become brittle and thickened (syphilitic onychia).

The Pustular Syphilides.—These syphilides may appear at any time during the secondary stage, or even as late as the tertiary period. The pustules vary in size, from that of a pinhead to that of a ten-cent piece; are round or oval, and surrounded by a coppery zone. They may begin as papules or pustules. In some cases they cover the entire body, while in others they are limited to special regions. The crusts of the small pustules are greenish brown in color; while those of the larger and later ones are greenish black, and somewhat adherent. Beneath the small crusts there is little if any suppuration, but under the larger ones there are well-marked ulcers.

The Small Pustular or Acneform Syphilide.—This is a papulopustular syphilide and attacks the sebaceous and hair follicles. It consists of small, conical, or slightly rounded pustules.

The appearance of this eruption is usually attended by more or less fever, which may last for some days, the temperature varying from 99° to 100° F., or over.

In some cases the pustules are transformed into small ulcers; in others they run together, forming complete or partial rings.

The eruption usually begins about the face, the scalp, the back of the neck, and the shoulders, and may then invade the entire body, but is most marked upon the scapular,

sternal, and gluteal regions, and on the outer aspects of the extremities.

This syphilide generally appears from the third to the sixth month of the secondary period, and may run a very chronic course; it relapses usually as a larger pustular or tubercular syphilide. The pustules leave small brown spots of pigmentation which disappear in a few months, or cicatrices which destroy the hair follicles, thus producing permanent alopecia.

The Large Pustular or Impetigoform Syphilide.—This is a pustulocrustaceous eruption, having a tendency to involve large areas of surface and to become serpiginous in character.

It usually appears about the middle or latter part of the first year of the disease, but may occur earlier or later.

Most of the pustules are about the size of a pea, or larger, and found upon the hairy parts, seldom on the hands and feet.

The eruption commences as red spots, which are soon transformed into pustules; these are covered by dark-brown adherent crusts, which may run together, thus forming patches that attain a diameter of several inches; this is well seen on the face, at the margin of the scalp, in the scalp itself, about the alæ nasi and commissures of the lips, upon the chin, and in the beard.

In some cases the eruption becomes serpiginous, generally upon the upper extremities; it extends by a ring of ulceration, covered with a crust, and enclosing a healed area of skin. This serpiginous process may be either superficial or deep, according to the amount and depth of tissue it destroys. In neglected and untreated cases the ulceration may cause great destruction of tissue, especially upon the face and head (Fig. 118); this is rarely seen, however, if the patient receives

early and proper treatment. Healing occurs under the crusts, which fall off, leaving smooth, red surfaces that remain pigmented for several months.

This eruption is rarely present with the erythematous syphilide, but is not uncommon with the papular variety; it generally occurs in debilitated and alcoholic subjects, or in those who have neglected early treatment.

The Variolaform Syphilide.—This is a much less common eruption than the acneform variety, and resembles variola and varicella.

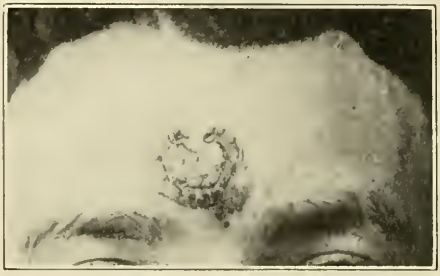


FIG. 118.—Serpiginous syphilide.

It is composed of round, superficial pustules, beginning as red spots, which in a day or so are converted into pustules. The pustules are surrounded by a deep red areola; when fully developed they become umbilicated. In about a week greenish-brown, slightly adherent crusts are formed, beneath which is an ulcerated base.

They run a chronic course, do not increase in size, but in severe cases may merge together.

They occur where the skin is soft and delicate, as upon the forehead, and at mucocutaneous junctions, and are rarely found in the palms or on the soles.

The eruption begins about the face and spreads over the rest of the body.

When the crusts fall off, their former sites are indicated by spots of pigmentation.

The Ecthymaform Syphilide.—There are two forms of this syphilide—the superficial and the deep.

The *superficial form* may appear at any time during the first year of syphilis, and consists of pustules; these begin as red elevations of the skin, which are soon transformed into pustules; these increase in size and are covered by round or conical crusts of a yellowish-brown color. Beneath the crust is an ulcerated surface, which secretes a thick pus.

The pustules generally appear first about the scalp, particularly at its junction with the face and neck, and in a short time invade the various parts of the body, as the anterior surfaces of the legs and forearms, the trunk, and the inguinal and gluteal regions. The pustules may be disseminated, grouped in patches, or arranged in the form of circles or segments of circles. In some cases they leave cicatrices, while in others they do not.

The *deep form* of this syphilide is, as a rule, a late manifestation, but may be precocious, and is then very malignant.

The eruption begins as round or oval elevations, upon which pus forms; this dries into a blackish-brown crust, having beneath it a deep, sharply defined ulcer, which, when healed, leaves a white cicatrix.

When the eruption is matured, it consists of an incrusted papulotubercle, from one-quarter to one-half inch in diameter, and surrounded by a copper-colored zone.

It is most marked upon the anterior surfaces of the legs, the arms, about the face, and on the lower portions of the trunk.

Rupia.—This eruption consists of ulcers covered by laminated crusts. It may appear during the first year of syphilis, but is usually a late manifestation of the disease.

There are two varieties of rupia; one in which the crusts are small, numerous, and scattered; another in which they are larger, less numerous, and grouped together.

Fig. 119.—Rupia. (Taylor.)

The small variety (see Fig. 119), begins about the face or the forearms, and may then invade the trunk and the lower extremities.

The large variety is most common on the face and trunk, but may also appear on the extremities.

The lesion begins as a red spot which is transformed into a flat pustule; this soon dries into a small greenish-brown

crust, having beneath it an ulcerated surface, the secretion from which forms another and larger crust under the initial one; this process continues, each crust being larger than the preceding one, until finally we have a conical, laminated, brownish-black, hard, adherent crust, beneath which is an undermined ulcer, with a foul, purulent secretion and surrounded by an area of redness.

The lesion is often single, although a number may be formed at the same time.

The resulting cicatrices are shining white, depressed, and surrounded by a brownish line of pigment which may remain for some time.

The Bullous Syphilide.—This syphilide is, as a rule, a late manifestation. It begins as an effusion of serum beneath the epidermis, which, becoming turbid, is finally converted into pus. The pus gradually dries into an adherent greenish-black crust, beneath which is an ulcer.

The bullæ vary greatly in size and are surrounded by a red areola. They generally occur on the forearms and legs, but may also invade the trunk, and are then most marked upon the chest.

The Tubercular Syphilide.—The tubercular syphilide consists of circumscribed or diffuse infiltration involving the entire thickness of the skin.

It really belongs to the tertiary period, but may appear in the secondary stage.

The non-ulcerative or resolutive tubercular syphilide occurs in two forms: (1) as sharply defined, conical, or rounded tubercles, and (2) as more or less elevated, flat, sharply circumscribed, and often scaly patches. As a rule, these lesions do not ulcerate.

The conical or rounded tubercles vary in size from one-

third of an inch to an inch or more in diameter, and are deeply seated in the derma. They begin as pinkish or dark red spots, and eventually become deep, circumscribed tubercles of a pinkish-red, or brownish-red color. On the face they have a smooth, shining surface, with little or no

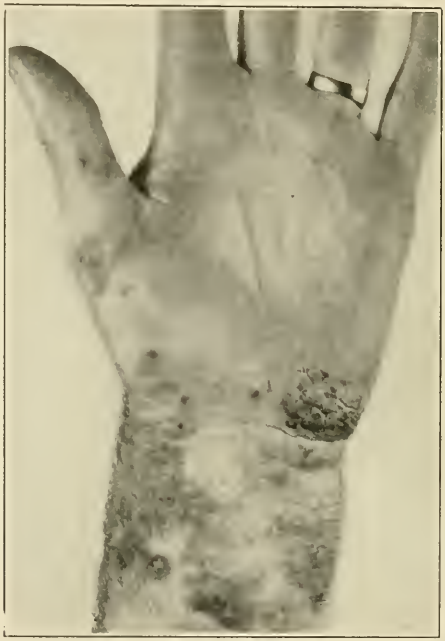


Fig. 120.—Tubercular syphilide. (Author's case.)

scaling, but upon other regions they are frequently covered with large adherent scales (Fig. 120).

If this syphilide appears in the secondary period, it usually invades the entire body; but if it occurs later, it shows a tendency to attack the face, the forehead, the scalp, the

back of the neck, the shoulders and scapular regions, the thorax, and especially the back, the gluteal regions, the outer aspects of the extremities near the joints, and the backs of the hands, very rarely the palms and soles.

The second form consists of flat, sharply circumscribed, deeply seated patches, and is less frequent than the first form. It commences as small red spots which increase in size from one to two inches in area. The tubercles are slightly elevated, and look like patches of thickened and reddened skin covered with scales, and surrounded by a narrow areola of redness.

Exceptionally, they form circles, or, if irritated, patches, which may increase at the periphery and atrophy at the centre.

On parts subject to friction or pressure the tubercles sometimes ulcerate.

The Gummatous Syphilides.—There are two varieties of these syphilides: the early secondary or precocious gummata, and those occurring late in the disease and called tertiary.

Of the early secondary or precocious gummata there are three varieties: the generalized, the localized, and the neurotic.

The generalized variety may appear as early as the eighth week or as late as the middle of the second year of the disease.

It begins as small circumscribed swellings beneath the skin, which soon adhere to it and form bright red spots about the size of a bean. As they increase their color becomes coppery. When fully developed they are firm in consistence; but as they mature they become softer.

If the disease progresses favorably, these lesions do not ulcerate, but resolve, leaving spots of pigmentation.

This eruption may be general and involve the entire body. Its favorite sites are the arms, the forearms, the back, the chest, the gluteal regions, the thighs, and the legs.

If ulceration takes place, the tumors become dark red in color and fluctuating, the integument is destroyed, and thus is revealed an unhealthy, undermined ulcer, secreting sanious pus.

The localized variety usually appears about the fifth month or within the first year, and in some instances even later. The tumors are the same as in the first variety, except that they are larger and more indolent.

The eruption is generally found on the head, the face, the pharyngeal walls, the mouth, the forearms, and the legs, but may also be met with upon the trunk, the arms, and the thighs.

These tumors likewise have the stages of condensation and softening; they may either be absorbed or ulcerate.

The generalized and localized varieties of gummata occur in elderly, debilitated, and alcoholic subjects.

In the neurotic variety the syphilide appears during the very early months of the disease, is preceded or accompanied by severe neuralgic or rheumatic pains in the joints or muscles, and by general malaise and debility. There are flashing, burning pains, either intermittent or continuous, at the sites of the lesions. There are also some rise of temperature, loss of appetite, and emaciation. The tumors generally occur on the forearms and legs, but may be found upon the shoulders, the arms, the thighs, the chest, and the trunk.

This eruption consists of two lesions: (1) of oval or round tumors or irregular plaques, and (2) of tumors situated in the subcutaneous tissue and freely movable beneath the skin and upon the fascia.

The tumors begin by infiltration into the skin and connective tissue; at first they are bright red, round, or oval, circumscribed swellings, which soon become raised above the level of the surrounding integument.

In some cases the bright red color becomes darkened into a blackish red, in others into a deep bright red, and again in others the centre becomes white and is surrounded by a deep red border.

Some cases resolve, others ulcerate, and if the latter be the case the resulting cicatrices are usually superficial.

Late or Tertiary Gummata.—These lesions belong to the late stages of the disease, and consist of circumscribed tumors.

The eruption is composed of a small number of lesions whose course is slow and painless. It generally occurs on parts where the connective tissue is loose and abundant.

When the lesions are subcutaneous they are gummous or gummatous tumors; but if they ulcerate and involve the skin they are called gummatous ulcers.

This syphilide has three stages: the stage of tumefaction, the stage of ulceration, and the stage of repair.

It commences as painless, movable nodules about the size of a pea, and situated beneath the integument. As they increase in size they form adhesions with the skin, periosteum, and fascia.

The integument over the nodules is at first red, but finally becomes coppery red and much thickened.

The lesions are true gummy tumors, varying in size from that of a pea to several inches in diameter, more or less convex and surrounded by an area of inflammation. They are prone to develop in groups, and may either fuse together or remain isolated. The tumors may remain solid for weeks or months, but with proper treatment then undergo resolution.

As a rule, they degenerate in either of the following ways: By ulceration, which may occur on the skin and involve the entire lesion, or the new growth may soften and cause ulceration in the skin. The resulting ulcer is similar in shape to the tumor; the floor is uneven, reddish green or yellowish green in color, and secretes sanious, fetid pus. The edges are

Fig. 121.—Gummatous ulcers. (Author's case.)

sharply cut, perpendicular, and surrounded by an inflammatory areola (Fig. 121).

The cicatrices, which are thin in some cases, but thick and rough in others, soon lose their coppery color and become white.

This syphilide may occur on the scalp, the face, or the neck; its favorite sites are on the extremities, near the joints, the back more frequently than the chest, very often

upon the gluteal regions, rarely upon the lower part of the abdomen, never on the palms or soles.

The Serpiginous Syphilide.—There are two varieties of this syphilide: the superficial and the deep.

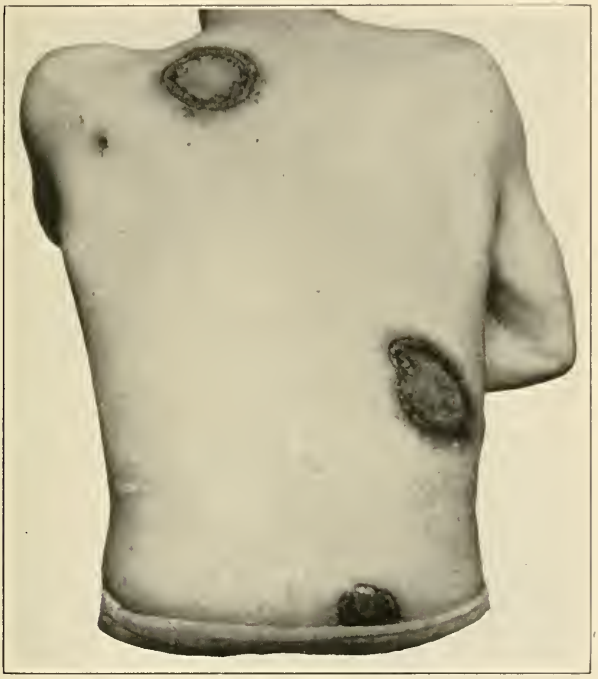


Fig. 122.—Serpiginous syphilide. (Taylor.)

The superficial serpiginous syphilide belongs to the early period of syphilis, and begins as a pustule; a crust forms upon it, beneath which is a superficial ulceration; the crusts fall off except at the periphery, where they form a ring, the enclosed area being oval or round in shape and hyperemic.

Beneath the ring of crusts is a corresponding ulcer, surrounded by an inflammatory areola. The ulcerative process extends, being covered by the crusts, while the central portion cicatrizes. When ulceration ceases, it leaves slight atrophy of the skin and copper-colored pigmentation.

The deep serpiginous syphilide originates in one of the late or tertiary lesions, such as a tubercle, an ecthymaform pustule, or an ulcerating gumma.

Changes similar to those in the superficial variety take place until there is developed a red cicatrix surrounded by a wide ring of greenish-black crusts, beneath which is an ulcerating, ring-shaped surface (Fig. 122).

It usually occurs on the inner surfaces of the arms and forearms, upon the breast and the legs.

The resulting cicatrices may be thick or thin, and if situated near joints they are liable to cause permanent deformity from their contraction. The pigmentation finally fades, leaving whitish scars.

The Pigmentary Syphilide.—This syphilide occurs in the early months of the disease and consists of brown or yellowish-brown spots or patches.

There are three forms of the pigmentary syphilide:

The first form consists of sharply defined or irregular spots or patches, of a yellowish-brown or brown color, which is unaffected by pressure. They vary in size from that of a pea to an inch or even more in diameter, are not elevated, and do not scale.

The second form occurs as a diffuse pigmentation, and is more common than the first variety. It usually begins on the sides or the back of the neck, and thence invades the chest and back for a short distance. The color varies in different subjects, from a very light to a light brown or even

a decidedly brown hue. Upon the surface of a patch appear several small, round, oval, or irregular white spots; these increase slowly, in some cases becoming whiter than the normal skin, while in others they are of the same color.

The third form consists of an abnormal distribution of the pigment of the skin, and is the least common of all.

The normal color of the integument becomes white, in spots of irregular size and shape; the spots are surrounded by a dark border, which becomes deeper in color as the white spots increase.

The lesion may appear as early as the second or third month, but usually occurs at the sixth month, and during the second or even the third year.

This syphilide is generally situated upon the neck, and especially its sides, less frequently upon the forehead and face, but may also appear upon the flexor surfaces of the extremities.

Malignant Precocious Syphilides.—By malignant precocious syphilides are understood certain eruptions, which, having a malignant ulcerative tendency, appear early in the course of the disease, and are accompanied by general cachexia.

Occurrence.—Pustular eruptions, particularly the impetigoform and the ecthymaform syphilides, and less frequently the papular eruptions, are prone to assume these characters. Such complications generally occur in debilitated and sickly subjects, in those addicted to alcoholic stimulants, or suffering from some form of severe and exhausting intercurrent disease. A faulty treatment is also a causative factor in some cases.

These syphilides are divided into three distinct varieties. The first is a pustular eruption, accompanied by ulcera-

tion and crust-formation. It commences as pustules, which ulcerate and form greenish-black crusts; the ulcers are deep and have a foul, purulent secretion. Beginning upon the face or scalp, it extends to the arms, and may eventually invade other parts of the body.

The second begins as small tubercles, which are rapidly transformed into ulcers, covered by thick crusts. Its course and situation are similar to the preceding class.

The third variety is a very destructive and, fortunately, quite uncommon syphilide.

It commences as dark red, deeply seated tubercles, in the centre of which a black slough forms; it increases in size, and is thrown off, exposing a deep undermined ulcer, with foul, ichorous secretion. Each tubercle is surrounded by a zone of redness. When healing occurs a depressed, copper-colored cicatrix is left, which in time becomes white. The eruption is situated upon the face, the extremities, the shoulders, and the buttocks.

CHAPTER XXIII.

SYPHILIS OF THE APPENDAGES OF THE SKIN.

THE HAIR.

Syphilitic alopecia is rarely encountered, and then to a limited extent only, in cases that have received early and appropriate treatment. It may be either slight or quite extensive, and runs a rapid course in some cases and a chronic one in others.

As a general rule, it is unaccompanied by heat or itching. There may be no marked lesions of the scalp, or there may be macules, papules, pustules, or ulcers.

The eyebrows, the beard, and the moustache, the hair of the pubes, the axillæ, and that on the body generally may be involved; the eyelashes are seldom attacked, unless by an ulcerative lesion.

There are two varities of syphilitic alopecia: (1) a general thinning of the hair; (2) loss of the hair in spots or patches of irregular size and outline.

Alopecia is the result of impaired nutrition of the hair-follicles, and is usually transitory. Permanent baldness may result, however, from ulcerative processes attacking and destroying the hair follicles.

THE NAILS.

Syphilitic lesions of the nails are of two varities: (1) *onychia,* in which the disease begins in the substance of the

nail; (2) *perionychia*, in which the disease commences around the nail, and finally involves it (see Figs. 123 and 124).

FIG. 123.—Onychia. (Author's case.)

Onychia.—In syphilitic onychia the process may be dry and limited to the nail, or the nail may be separated from its bed by a moist, exudative process.

FIG. 124.—Onychia of thumb nails. (Author's case.)

In dry onychia the nail loses its lustre and transparency and becomes dull yellow in color. The disease may be limited by a line of demarcation, or involve the entire nail.

The edge of the nail becomes thick, brittle, and cracks readily; its surface is rough and marked by shallow, longitudinal fissures and depressions; the surrounding epidermis is generally thick and scaly.

The diseased portion is gradually pushed forward, grows out, and is replaced by healthy nail tissue.

Separation of the nail may be partial or complete and generally occurs in the early part of the secondary stage.

It begins at the free border of the nail, and gradually creeps toward its base, the diseased area becoming greenish brown in color. If only a portion of the nail has been destroyed, the healthy part pushes forward and covers the denuded space; but if destruction has been complete, an entirely new nail is formed.

One or several nails may be affected; those of the fingers more frequently than the toes.

Perionychia.—There are two varieties of syphilitic perionychia: the non-ulcerative and the ulcerative forms.

The non-ulcerative form attacks a portion of or the entire attached border of the nail, which becomes infiltrated and thickened; this condition may persist until the nail loses its lustre and is marked by transverse furrows. Ulceration sometimes occurs where the skin is reflected from the nail, and extending beneath it causes it to loosen and fall off.

The ulcerative form may begin as a papule, pustule, ulceration, or fissure at some part of the nail margin, and spread beneath it, secreting a foul pus. The whole nail may be destroyed, or only a portion of it; but if the process be checked a new nail forms and pushes the old one out in front of it.

If the ulceration is severe, the entire matrix becomes involved; the nail is thrown off, leaving a yellowish surface,

surrounded by an ulcerated and inflamed border. In such cases the entire phalanx is swollen.

Unless the ulcerative process has been too severe, a new nail is produced, which, after a little time, may become quite as good as the normal one.

There is sometimes a local necrosis of the nails, which become white in spots about the size of a pinhead; these are finally depressed and extend to the matrix, leaving sharply cut holes in the nail.

CHAPTER XXIV.

SYPHILIS OF THE MUCOUS MEMBRANES.

ERYTHEMA.

Erythema of the mucous membranes may occur at any time during the course of syphilis, particularly in the first few months; it is similar to that of the skin, but is modified by the moisture and irritation to which mucous membranes are subjected. It most frequently involves the fauces and pituitary membrane.

There may be a simple redness of the mucous membrane without swelling, or redness with edema of the parts. In the more advanced cases the mucous membrane has a milky appearance, its epithelium becomes detached in spots, thus causing erosions of the surface, which in some cases is dry, while in others it is covered by an abundant secretion which renders the saliva very infectious, owing to the large number of spirochetes it contains, a fact which must be made very clear to the patient.

MUCOUS PATCHES.

Mucous patches, also called mucous papules, consist of flat, or slightly convex, pearl-colored elevations, whose surface resembles mucous membrane, and whose secretion is highly contagious.

They are situated on the inside of the cheeks, particularly at the angles of the mouth, upon the lips, the tongue, the

gums, the uvula and the tonsils, at the openings of the nares, on the pillars of the fauces, the hard and soft palate, and upon the conjunctiva and the umbilicus.

They are one of the earliest and most frequent secondary manifestations of syphilis. The lesion consists of a hyperplasia of the papillæ and a proliferation of cells in the mucous layer; the epithelium on the surface of the patch may remain intact or become detached, the surface being depressed by ulceration or raised by further development of the papillæ.

Uncleanliness, irritation, heat, and moisture favor their development, as do also the use of alcohol and tobacco and a rough and uncleanly condition of the teeth.

Mucous patches within the mouth are of a grayish-white color, looking as if the mucous membrane had been touched with nitrate of silver or pure carbolic acid. They are irregular in outline, and, as a rule, not elevated; when situated upon the tonsils, they usually ulcerate, owing to the constant friction to which these organs are subjected.

CONDYLOMATA.

Condylomata are in realty nothing more than exaggerated mucous patches, which, from their situation upon the integument around the anus and genital organs, are altered in appearance (see Fig. 110). They consist of round disks, either single or multiple, of a reddish or grayish color, with granular surface and elevated above the surrounding parts. They begin as small red spots, whose epidermis, being removed by friction, leaves a moist, grayish surface, which is finally converted into an elevated wart-like disk, with offensive secretion loaded with spirochetes, which render it highly contagious.

CHAPTER XXV.

SYPHILIS OF THE DIGESTIVE ORGANS.

THE MOUTH.

Besides erythema and mucous patches of these parts, above alluded to, papules may occur in the mouth during a general papular eruption. *Vesicles* are very rare in this situation, however, owing to the constant moisture and friction, which prevents their formation.

Near the angles of the mouth, especially in habitual smokers, are frequently seen patches called smokers' patches or plaques. They consist of an accumulation of epithelial cells, which becomes whitish in color, and in some instances fissured or eroded.

THE TONGUE.

The secondary or early lesions of the tongue consist of erythema of its mucous membrane, mucous patches, and fissures. They yield readily to appropriate treatment, but are very liable to recur, especially in smokers and drinkers, and in those with rough and decayed teeth.

Erythema of the tongue may involve the entire organ, or be limited to patches which are scattered over its surface.

Mucous patches are usually situated upon the sides or tip of the tongue, and resemble similar lesions situated on other mucous membranes.

Fissures of the tongue are the result of erythema or mucous patches, and are usually situated on its sides or dorsum.

Sclerosis of the tongue may develop in the later stages of the disease. It occurs upon the dorsum, and is either superficial or deep in character.

Fig. 125.—Tertiary syphilis of tongue (sclerosis). (Author's case.)

Superficial sclerosis involves only the mucous membrane, and produces a "parchment" induration. It is either circumscribed or diffuse, and ulcerates only when injured by the teeth or irritated by alcohol and tobacco.

Deep or parenchymatous sclerosis (Fig. 125) attacks the mucous and muscular tissues. The tongue may be greatly increased in size, but after a time the newly formed fibrous

tissue retracts and the organ becomes atrophied. The edges of the tongue receive the markings of the teeth, while the body is lobulated. The lobules are separated by furrows which cannot be effaced. Ulceration may ensue from irritation or injury.

Gummata may be either superficial or parenchymatous.

Superficial or mucous gummata commence as small nodules, which soon soften and ulcerate. The ulcer has perpendicular walls, infiltrated base, and its floor is covered with a yellowish-white film.

Parenchymatous gummata begin as small nodules in the muscular tissue of the tongue; they undergo degeneration and finally the mucous membrane covering them ruptures, leaving a deep cavity, with sloughing undermined walls, and surrounded by an indurated areola.

The differential diagnosis between syphilitic ulcers or gummata of the tongue and those of non-specific origin is very important and oftentimes difficult, cases having been reported in which gummata and gummatous ulcers were thought to be cancerous, and the tongue, in part or in totality, removed.

The Wassermann reaction, examination of smears from the ulcers for spirochetes, and the sectioning of tissue excised from the lesion may all have to be resorted to to settle the diagnosis.

The initial lesion is usually situated at or near the tip of the tongue (see Fig. 107), is single, surrounded by induration, and the lymphatic glands in anatomical connection are markedly enlarged and, as a rule, do not suppurate. Dark-field examination of smears from the ulcer will reveal the Spirocheta pallida. In this connection it is well to remember the possible presence of the Spirocheta refringens, in order

to avoid a mistake in the diagnosis of the particular spirocheta found.

Gummata are insidious in their origin, chronic in their course, and generally free from pain. They are situated upon the dorsum and posterior half of the tongue near the median line. The lymphatic glands are rarely affected, and the functions of the tongue are not interfered with.

Gummatous ulcers are usually multiple and situated upon the dorsum. The floor is sloughy and slightly vascular, and the edges are undermined. Lymphatic enlargement is rare unless pyogenic infection occurs. They cause some pain.

It must always be borne in mind by the physician, that late secondary and tertiary lesions of the tongue have a marked tendency to malignant degeneration, and that they should be promptly and energetically treated, and not allowed to become chronic and ulcerating in character.

Tubercular ulcers of the tongue are painful; they are usually situated at or near its tip or edge; they are generally single, but may be multiple. The lymphatic glands may or may not be affected. The ulcer has bevelled edges, flabby granulations, and is not surrounded by induration. The microscope seldom shows tubercle bacilli, but particles of caseous matter may be seen. They may occur at any age.

Carcinoma: The ulcer is single, very painful, and situated on the borders and anterior half of the tongue; its edges are raised and hard, and the surrounding tissues are thickened. The floor is very vascular, bleeds readily, and secretes an ichorous pus. The functions of the tongue are interfered with. The lymphatic glands are always enlarged. The microscope shows cancer cells in the sections from the growth. The condition usually appears in patients over forty years of age.

GUMMA OF THE SOFT PALATE.

In this affection premonitory symptoms are insignificant or entirely absent. Suddenly the voice becomes transformed into a nasal whisper, and attempts at swallowing liquids or solids are followed by their regurgitation through the nose.

The lesion commences in either of two ways: (1) a circumscribed deposit of gummatous material takes place between the buccal and nasal surfaces of the soft palate; or (2) there is a diffuse infiltration of the entire velum, its mucous membrane becoming reddened and its mobility impaired. Rupture of the abscess or ulceration of the infiltrated tissues may involve one or both mucous surfaces, thus causing partial or complete perforation of the soft palate with its concomitant symptoms such as regurgitation of the food and nasal articulation. As the process of repair commences, the opening gradually contracts until it is greatly diminished in size, or, in some cases, completely occluded.

THE PHARYNX.

Erythema, superficial ulcers, and deep ulcerations, resulting from the degeneration of gummatous tumors, may be observed; mucous patches are extremely rare in this region.

The posterior portion of the lateral walls is most frequently attacked. Gummatous tumors have been seen upon the vault of the pharynx and on the upper part of its posterior wall. The lesions encountered in this region are similar to those observed in the mouth, and require about the same local and constitutional treatment.

THE ESOPHAGUS.

Syphilitic ulceration of the mucous membrane of the walls of the esophagus sometimes occurs in untreated cases, and as the ulcers heal, their cicatrices contract, thus forming stricture of the tube, which, because of the narrowing, interferes with deglutition, and therefore with the proper nourishment of the patient, who becomes emaciated and feeble.

If the diagnosis is made early enough and proper treatment instituted, the formation of a stricture can be avoided.

Cases of gumma of the esophageal wall have been reported.

THE STOMACH AND INTESTINES.

Accompanying the appearance of the early secondary manifestations there is sometimes seen functional disturbance of the digestive organs, such as loss of appetite, nausea, and vomiting. This is probably due to syphilitic erythema of the stomach and intestines.

Ulcerations of the mucous membrane of these viscera, possibly due to degeneration of gummatous deposits, have been observed at postmortem examinations.

THE RECTUM AND ANUS.

Syphilitic lesions of the anus and rectum may be primary, secondary, or tertiary in character.

The primary lesion, or chancre, is found in this region not infrequently, and possesses the same characteristics as in other parts of the body.

Secondary manifestations include macular or papular eruptions about the anus, which, owing to moisture and the

constant contact of the parts, soon become transformed into mucous patches or condylomata. The lesions may also occur about the anus in the form of tubercular syphilides. In the rectum itself the most frequent syphilitic lesion is the secondary ulcer. The ulcers may be single or multiple; they are "punched-out," with sharply defined, indurated edges, and, at first, involve only the mucous membrane and submucosa. In their later stages they extend deeper, with marked destruction of tissue, and give rise to a foul, offensive and highly infectious discharge. The sacral lymph nodes are markedly enlarged and the wall of the rectum in the neighborhood of the ulcers is tough and indurated. Healing, in this stage, is very liable to be followed by stricture of the rectum, owing to the extensive formation of fibrous tissue which occurs.

The tertiary manifestations include gumma, which may be single or multiple, and a peculiar slow, productive inflammation, with extensive connective-tissue production.

The gummata may break down and ulcerate, in which case stricture is liable to occur, and this is even more frequently the case after the form of proliferative proctitis described above.

Cases of gummatous infiltration and ulceration have been mistaken for carcinoma, and the patient subjected to extirpation of the rectum, a fact which must not be forgotten by the surgeon when examining these cases.

THE LIVER.

The liver is invaded by syphilis more frequently than any other abdominal organ.

Congestion of the liver sometimes occurs in the secondary

stage of the disease, and is usually associated with a cutaneous eruption; it may last for from one to several weeks in untreated cases.

The symptoms are icterus, gastric disturbances, and febrile reaction, the organ being sensitive on pressure.

This condition is probably due to the extension of a specific catarrh of the intestine to the liver, by way of the common bile duct.

The tertiary forms of syphilitic affections of the liver are: amyloid degeneration, perihepatitis, and hepatitis, of which there are two forms, the diffuse and the gummatous.

The symptoms of hepatic gumma are often obscure; the organ may be increased in size and nodules felt upon its surface. Pain may be present or absent. The functions of the organ are not interfered with unless the tumors are numerous or large. In severe cases there may be icterus, gastro-intestinal disturbance, and clay-colored stools, due to obstruction of the gall ducts by pressure from the tumor.

Without the assistance of the Wassermann reaction the differential diagnosis from carcinoma may be very difficult, even after an exploratory laparotomy.

The diffuse variety is clinically indistinguishable from other forms of hepatic cirrhosis.

THE SPLEEN.

In rare cases enlargement of the spleen occurs early in the course of syphilis. The swelling is quite rapid, usually painless, but may give rise to a feeling of weight in the left hypochondrium. It generally subsides in three or four weeks, but may remain several months, if treatment is

withheld or is inadequate. It may occur at any time during the secondary period.

Gummata of the spleen are either single or multiple, and vary in size from that of a millet-seed to a walnut; they may be deeply seated or situated upon the periphery of the organ.

THE PANCREAS.

Specific affections of the pancreas are very rare, but it cannot be denied that, like the other viscera, it is subject to the diffuse and circumscribed lesions of syphilis.

CHAPTER XXVI.

SYPHILIS OF THE RESPIRATORY ORGANS.

THE NOSE.

The mucous membrane lining the nose may be the seat of erythema, mucous patches, and ulcerations, as can be readily demonstrated by examination with the nasal speculum. The symptoms of these lesions resemble those of ordinary catarrhal rhinitis.

In the later stage of syphilis deeper ulcerations may occur, which originate in gummatous infiltration of the submucous tissue, and may finally involve the adjacent cartilages and bones, thus leading to serious deformity of the organ from destruction of its framework (saddle-nose).

THE LARYNX.

Laryngeal lesions are very variable as regards their time of appearance and the severity of their symptoms. The invasion is usually insidious, and the course chronic and painless.

The secondary or superficial lesions consist of erythema, mucous patches, superficial ulcerations, chronic inflammations, and vegetations.

Erythema of the larynx causes some huskiness of the voice and slight catarrh. It may occur during the course of the

early skin eruptions, and is either diffuse or circumscribed; superficial erosions sometimes develop.

Superficial ulcerations involve only the mucous membrane. Their margins are sharply defined, regular, and slightly elevated, and the floor is covered by a tenacious secretion. They may interfere with phonation to a more or less marked degree.

Mucous patches may be situated upon any portion of the mucous membrane. If exposed to irritation during respiration or phonation they become prominent, with ragged margins.

Chronic inflammation may appear early or late in the disease. It is a very persistent affection, and usually leads to a thickening of the mucous membrane. Chronic ulcers are always associated with this condition.

Vegetations may spring from the margin of an ulcer or from the mucous membrane itself.

The tertiary lesions comprise deep ulcerations, gummata, inflammation, and necrosis of the cartilages.

Deep ulcerations occur, and generally begin, in degenerated gummata. Extensive regions may be destroyed in this manner.

Gummata of the larynx may be either single and large or multiple and small.

The deposit sometimes undergoes absorption, but without treatment it usually degenerates, forming deep, ragged ulcers, which may attack the framework of the larynx and produce permanent deformity.

These lesions are liable to cause an impediment to respiration, either from their size or from causing acute edema of the larynx.

Perichondritis is usually caused by an extension outward

of an inflammatory or ulcerative process from the mucous or submucous tissue. The cartilages themselves may be invaded by the process and partially or totally destroyed.

Necrosis occurs in those cases in which the cartilages are ossified and is a very late manifestation. It follows perichondritis.

THE TRACHEA AND BRONCHI.

Syphilitic lesions of the trachea and bronchi are rare, but may be similar to those which attack the larynx.

Ulcerative processes, following gummatous infiltration, are the most common and sometimes result in stricture, from the contraction of their cicatrices.

The principal symptoms of tracheal syphilis are cough, purulent expectoration, and dyspnea. If stenosis of the tube occurs, its most common seat is just above the bifurcation.

THE LUNGS.

Pulmonary lesions due to syphilis are of rare occurrence. They include syphilitic sclerosis, or induration, and gummata.

Syphilitic sclerosis affects a variable extent of the middle or lower lobes but rarely involves an entire lobe; it may be disseminated at various points. The diseased portion of lung becomes firm, elastic, and furrowed, while the contained bronchi are flattened and the surrounding pleura more or less thickened.

Gummatous tumors may be single or multiple, and resemble those situated in other organs. They are not at all common, but occur more frequently than syphilitic induration. They

undergo degeneration from the centre outward, leaving cavities with white, fibrous walls.

In some cases syphilitic lesions of the lungs cause no symptoms; in others there is more or less disturbance of respiration, and in yet others there are cough, pain, expectoration, and all the symptoms of pulmonary tuberculosis. The temperature rarely goes above 101° F. The diagnosis depends on the presence of a positive Wassermann reaction and the absence, on repeated examination, of tubercle bacilli from the sputum.

THE PLEURA.

During the secondary stage of syphilis patients may complain of pain in the chest, which is associated with more or less rise of temperature and a moderate amount of effusion into the pleural cavity.

CHAPTER XXVII.

SYPHILIS OF THE ORGANS OF CIRCULATION.

THE HEART.

Tertiary syphilis may attack the heart in either of two ways: (1) as a chronic inflammation (myocarditis), and (2) as gummatous tumors.

Endocarditis occurs about the end of the second year, and is usually associated with myocarditis; most frequently it attacks the left ventricle at the apex or base of the organ. Gummatous endocarditis attacks any and all parts of the heart, giving rise to tumors of various sizes. Pericarditis usually follows myocarditis, and attacks either the visceral layer or the entire pericardium.

Gummatous tumors of the pericardium are very rare, and usually follow myocarditis.

The symptoms of cardiac syphilis are absent in many cases and very obscure in others. The action of the heart may become irregular and feeble, and the patient suffer from palpitation, dyspnea, cyanosis, and pain over the precordium.

The diagnosis is rarely made except by the disappearance of the symptoms after antisyphilitic treatment administered for some other manifestation of the disease.

THE BLOODVESSELS.

Syphilitic affections of the veins and capillaries are very rarely encountered.

The arteries may be attacked primarily or secondarily to specific disease of the surrounding tissues. Primary lesions generally occur in the small arteries of the brain. In the large arteries gummatous foci sometimes appear, which may break down and perforate the vessel wall, with resulting hemorrhage into the surrounding tissue or body cavities.

In affections of the smaller arteries the caliber of the vessel is reduced, and sometimes occluded, by a new, dense, cellular formation in the internal coat, which resembles granulation tissue, and finally becomes organized (endarteritis obliterans). This new formation involves the entire circumference of the vessel, and extends outward as well as inward, invading both the middle and external coats. It occurs in patches, which are generally single; a thrombus may form on the patch, become organized, and thus obstruct the lumen of the vessel; or it may become detached, with a resulting embolism.

In some instances the changes in the artery are very slight, the process being limited to the internal coat; in others the vessel is thickened, rigid, and nodulated in appearance.

The disease most frequently affects the carotid and its branches, especially the middle cerebral; syphilitic aortitis is also quite frequently encountered.

These lesions may occur as early as the first year or as late as the twentieth, but, as a rule, appear about the third year after infection, in untreated or improperly cared-for cases.

As can readily be seen from the above, the symptoms will depend entirely on the location of the lesions.

CHAPTER XXVIII.

SYPHILIS OF THE GENITO-URINARY ORGANS.

EPIDIDYMITIS.

Syphilitic epididymitis may occur as early as the second month or as late as the fifth year, but generally develops within the first six months of the disease, in insufficiently treated cases.

It is more commonly unilateral and, as a rule, attacks the globus major.

Its invasion is usually unattended by any symptoms, except occasionally, when there is a slight sense of uneasiness in the part.

The lesion consists of a smooth, hard, round, or oval and non-painful tumor, situated just above the testicle, usually about the size of a pea, but in some instances larger. It shows no degenerative tendency and quickly disappears under antisyphilitic treatment. The scrotum remains unaffected.

ORCHITIS.

Syphilitic orchitis is sometimes observed as early as the fourth or fifth month, but in the majority of cases it is a tertiary manifestation and appears several years after infection.

One or both testicles may be involved, either at the same time or consecutively.

The body of the organ becomes increased in size, hard,

smooth, very heavy, and painless, and there is more or less hydrocele of the tunica vaginalis.

At the beginning of the disease there may be little projections upon the surface of the testicle, due to syphilitic deposits, which, as the process continues, fuse together, forming a hard tumor, resembling almost exactly the shape of the normal testicle. In other cases the surface of the tumor is perfectly smooth from the beginning.

The course of this affection is very slow. If untreated, it may result in partial or complete atrophy of the organ, or the parenchyma of the gland may degenerate into fibrous, cartilaginous, or even osseous tissue. As a general rule, suppuration does not occur, although it may occasionally follow the breaking down of gummatous deposits.

The lesions may be diffuse or circumscribed.

In the diffuse form the whole organ is increased in size, firm, hard, and resistant, and unless treated, becomes atrophied. There is also frequently a certain amount of hydrocele.

The enlargement is uniform; the outline of the epididymis is often lost, although it may appear as a separate swelling, surmounting the larger mass; the normal testicular sensitiveness is decreased or lost, and the induration is of a peculiar "woody" character. The organ feels peculiarly and characteristically heavy.

In the circumscribed form gummatous material is deposited in masses through the testicle. These masses have a tendency to undergo secondary degeneration and softening, thus causing inflammation and ulceration of the surrounding tissues, finally leading to syphilitic "fungus" of the testicle.

It yields readily to treatment, if recognized at an early period.

The vas deferens usually remains normal in syphilitic orchitis, although it may be involved; this is true also of the vesiculæ seminales and prostate gland.

The chief conditions to be differentiated are tuberculosis and malignant growths.

In tuberculosis the disease begins most often in the epididymis instead of the testis proper; the vas deferens is involved early in the disease, and there is frequently a coincident implication of the prostate and seminal vesicles.

Abscess and sinus formation are much more frequent.

Malignant growths are sometimes hard to differentiate, but, as a rule, the swelling is more nodular, its growth more rapid, and there is a marked tendency to cyst formation. Pain is also a more prominent feature.

The Wassermann reaction is of great value in clearing up the diagnosis.

The differentiation is important, as syphilitic testes have not infrequently been removed by mistake.

THE PENIS.

Gummatous deposits may occur in the penis, especially near the coronal sulcus, and are also occasionally found in the corpora cavernosa.

These syphilitic deposits gradually increase in size without giving rise to any pain, but soon cause deformity of the organ, especially during erection, owing to occlusion of the spaces of the erectile tissue.

THE UTERUS AND ADNEXA.

Syphilitic affections of the ovaries resemble those of the testes, but are rarely encountered.

The symptoms are slight pain and increase in the size of the organs, with loss of the sexual appetite and sterility.

The Fallopian tubes are very rarely involved.

Gummatous infiltrations and tumors of the uterus are occasionally reported.

Exulcerative hypertrophy of the cervix consists of an enlargement and hardening of the os, which becomes congested and ulcerated, the secretion from the ulcer being contagious, scanty, and mucopurulent in character. This lesion may occur at any time after infection, and runs a chronic course, but responds readily to local and constitutional treatment.

THE KIDNEYS.

In the kidneys of syphilitic subjects the same lesions may be met with as occur in the other organs, such as interstitial nephritis, to which the transient albuminuria met with in some patients is chargeable, gummatous tumors, and cicatrices, which latter result from the preceding affections.

CHAPTER XXIX.

SYPHILIS OF THE NERVOUS SYSTEM.

Syphilitic affections of the nervous system are of frequent occurrence; they may appear as early as the second month or as late as the twentieth year after infection, and are more frequent in men than in women. Nervous phenomena are more apt to occur in neurotic subjects and those addicted to alcoholic excesses; also in those who have not received proper and sufficient treatment in the early stages of the disease. Brain-workers, and those who are mentally and physically exhausted, are especially susceptible to nervous manifestations; as are also those who have suffered from sunstroke, or antecedent meningitis. Arteriosclerosis, or any other condition causing cerebral congestion, also renders the patient liable to nervous affections.

The Skull and Vertebræ.—Lesions of the bones may be situated on the inner surface of the skull or vertebræ, and, by the pressure they exert, cause inflammation of the meninges and secondary changes in the brain or cord. These lesions may be periostitis, osteitis, nodes, exostoses, or necrosis.

The Dura Mater.—The dura mater is very susceptible to syphilitic invasion. The changes produced in it are increase in thickness, roughening of its inner surface, and increased vascularity. It may be affected alone, or the disease may extend to the inner surface of the skull and the arachnoid,

or the dura mater may be secondarily involved by processes beginning in the pia mater and arachnoid.

The syphiloma may be diffuse or circumscribed. Syphilomata of the spinal dura mater resemble those of the cerebral in origin and course.

The Arachnoid and Pia Mater.—Affections of the arachnoid and pia mater consist of congestion and enlargement of the vessels, with increase of connective tissue and thickening. Sometimes gummatous infiltration occurs, giving rise to a gummatous meningitis.

The lesion may invade the dura mater and the bones of the skull, and is probably the most frequent syphilitic lesion. It occurs in patches, which are sharply circumscribed and either single or multiple.

The Brain and Cord.—Affections of the brain and cord are nearly always secondary to lesions of the bones, meninges, or bloodvessels, and consist of diffuse or circumscribed gummatous deposits.

The Arteries.—The large arteries, especially those at the base of the brain, are more commonly attacked by syphilis than the smaller ones and those of the convexity. The lesion consists at first of an infiltrated condition of the walls and more or less swelling of the endothelium; later on, the vessels become thickened and subject to an obliterating endarteritis, causing a diminution of caliber, which may, unless recognized and properly treated, go on to complete occlusion of the artery. The cerebral tissues supplied by the affected vessel are at first insufficiently nourished, and finally, receiving no nourishment at all, undergo degenerative changes from total lack of arterial blood supply.

The lesion, which may attack one or several vessels, either at the same time or successively, usually involves the

entire circumference of the artery, and may extend for an inch, or even more, along its length or continuity.

The Nerves.—The cerebrospinal nerves may be invaded by the lesions of the meninges, or they may be surrounded by gummata or compressed as they pass through bony canals.

The third pair, or motor oculi, are most often affected, although the first (olfactory), second (optic), fourth (pathetic), and sixth (abducent) are sometimes involved, and the seventh, or facial, quite rarely.

There may be a neuritis and perineuritis.

The peripheral nerves are affected in a similar manner.

The sympathetic nerves may be invaded in either one of two ways: (1) by pigmentary or colloid degeneration of the nerve cells; and (2) by sclerosis of the connective tissue, causing atrophy of the nervous elements.

Syphilitic Tumors of the Nervous System.—Two forms of syphilitic tumors occur in the craniovertebral cavity; they are usually connected with the cerebrum, but may be found in the medulla, the cord, or the cerebellum.

The first form is grayish red in color, highly vascular, and either firm or soft in consistence. It consists of small, round cells in a stroma of connective tissue.

The second form, which is really a degenerating stage of the first, is yellow in color and hard.

These tumors may be single or multiple, and vary in size from that of a pea to a walnut.

They occur chiefly on the under surface of the brain, near the Sylvian fissure, and, as a rule, are peripheral; but if found in the brain tissue itself, it will be observed that they have grown in from the vascular membrane.

Hemiplegia.—Syphilitic hemiplegia may occur as early as the third month or as late as the twentieth year after infec-

tion, and is usually preceded by localized headache, vertigo, and convulsions. Sometimes there are muscular spasms, pains, or numbness in the parts, which afterward become paralyzed.

The invasion may be either gradual or sudden, and usually comes on when the patient is engaged in some muscular effort or is in bed at night.

If the paralysis be partial it may gradually improve, or even disappear, or, as improvement takes place, the opposite side may be similarly affected.

In rare cases there is a loss of both motion and sensation; this may be accompanied by paralyses of various nerves, aphasia, mydriasis, optic neuritis, and epilepsy. Some patients suffer from mental depression, while others are very emotional.

Syphilitic epilepsy may occur as grand mal or petit mal.

It is a very frequent manifestation of cerebral syphilis, and is always preceded by severe headache.

The symptoms of the severe form, or grand mal, consist of sudden loss of consciousness, tonic and clonic spasms, facial distortion, foaming at the mouth, and stertorous respiration; the aura and epileptic cry are not always present. These convulsions generally occur at short intervals and with well-marked regularity; some patients regain consciousness in a few minutes, while others remain in a stupid condition for hours.

The mild form begins with twitching of the muscles of one side of the face, turning of the tongue to one side, a tendency of the subject to turn around, giddiness, general trembling or great weakness, or cramps in the extremities, loss of consciousness, and a convulsion. The seizure may be confined to a single limb or one side of the body. Very often there

is no spasm; the patient loses consciousness and stares vacantly into space; this condition lasts a few moments or even several minutes. If allowed to go on untreated the petit mal attacks are liable to develop into the severer form, gradually.

Paraplegia.—The spinal cord is not so frequently attacked by syphilis as is the brain, but luetic affections of it are not uncommon.

The causes of syphilitic paraplegia are lesions of the vertebræ, of the spinal meninges, and gummata which press upon the cord.

The symptoms consist of a varying amount of pain in the back, weakness of the lower extremities, darting pains in the legs, numbness, tickling or aching pains in the feet, with hyperesthesia or anesthesia. Loss of coördination is sometimes observed. The expulsive force of the bladder and rectum is weakened.

A patient may remain in this condition for a long time, until, unless properly treated, complete paralysis of both lower extremities finally comes on. General sensation may remain, or be somewhat impaired or lost.

Paraplegia is a later manifestation of syphilis than hemiplegia or epilepsy, and generally occurs after the sixth year of the disease, but may show itself much later.

Aphasia.—Disturbances of speech frequently occur during the course of syphilis of the nervous system.

There may be hesitation in speaking or inability to remember certain words in conversation and writing, or the use of inappropriate words.

The affection may be either continuous or intermittent in character.

Locomotor Ataxia.—It is now positively determined that locomotor ataxia, or tabes dorsalis, is invariably the result of antecedent syphilitic infection. The existence of a positive Wassermann reaction, at some time during the course of the disease, either in the blood or cerebrospinal fluid, or both, together with the discovery of the Spirocheta pallida in the spinal cord of tabetic patients, has definitely established this fact.

The condition begins most frequently between the thirtieth and fortieth years, although it may be found earlier, or even in old age. Men are far more frequently affected than women. It is probable that fatigue and overexertion, both physical and mental, are accessory causes.

The principal lesions in a developed case consist of thickening of the pia and arachnoid, combined with sclerosis of the posterior columns of the cord (columns of Goll and Burdach), usually in the lumbar region, but occasionally, also, in the cervical. In the early stages this sclerosis is found principally in the middle third of the posterior columns, but in advanced cases the greater part of the columns may be involved, with the exception of the endogenous fibers. There is usually a more or less marked lymphocytosis of the cerebrospinal fluid.

The disease may remain stationary for years after the first appearance of symptoms, and then suddenly recur, or it may progress steadily and rapidly from the very beginning. Periods of remission are not infrequent.

The most prominent and characteristic symptoms of the disease are:

"Lightning" pains in the extremities: paroxysmal and usually momentary, and often associated with tenderness,

either superficial or deep, so that they may be mistaken for rheumatism or sciatica.

Ataxia: due to loss of the muscle, tendon and joint senses, which results in incoördination of movement and overaction of the muscles.

Loss of the knee- and ankle-jerks.

Inability to stand with the feet together and the eyes closed—Romberg's sign.

The Argyll-Robertson pupil, which reacts to light but not to accommodation.

Inability to stop suddenly and turn around without staggering.

Gastric crises, so-called; and various genito-urinary disorders, such as slowing of the urinary stream, difficulty in starting and stopping urination, retention of urine, residual urine, cystitis, with stone formation, and loss of sexual power.

Less frequently we may find loss of the touch or pain senses; "girdle" pains about the epigastrium, which may be mistaken for renal colic or intercostal neuralgia; painless perforating ulcer of the foot; or the so-called Charcot joints, which occur most frequently in the knee or ankle and are characterized by a painless enlargement of the bones of the articulation, with intra-articular effusion, hard, periarticular edema, erosion of the cartilages and the formation of osteophytes within the joint, with consequent grating on motion, and finally subluxation.

General Paralysis (also known as general paresis).—This affection is manifested by such symptoms as cerebral excitement, gayness of spirits alternating with depression, together with delirium or even mania. The motor disturbances consist of uncertain movements without paralysis,

trembling of the hands, hesitating speech and staggering gait, headache, dizziness, and impairment of sight and hearing, with epileptiform convulsions.

These symptoms do not occur at the same time or in a regular manner, but appear at odd intervals.

From the foregoing description of the lesions of syphilis as it affects the nervous system it is easy to see that the symptoms depend entirely on the structures involved, and that they may shift and vary in a most bewildering manner.

The diagnosis must often be made almost wholly on a history of infection by the spirochete and on the presence of the Wassermann reaction in the blood or spinal fluid or both

CHAPTER XXX.

SYPHILIS OF THE MUSCLES.

MYOSITIS.

There are three forms of syphilitic affections of the muscles: (1) the irritative or hyperemic; (2) the chronic infiltrative; (3) the gummatous.

Irritative myositis usually occurs in the early stage of syphilis, and is associated with pain and soreness in the muscles, but leaves no permanent traces of its existence.

The chronic infiltrative form consists of the development of connective tissue in the interfibrillar spaces, which eventually hardens, resulting in atrophy and destruction of the muscle. Any muscle may be attacked, but the flexors of the upper extremity, and especially the biceps, are most frequently invaded.

The muscle gradually shortens without causing any pain; the patient first notices that he is unable fully to extend the limb, but no change is detected on palpation.

Its course is chronic, lasting for several months or years in untreated cases.

Gummatous tumors consist of circumscribed deposits of gummatous material. They are usually found in the larger muscles, such as the trapezius, the gluteus maximus, the sternomastoid, the vastus externus, the pectoralis major, and the walls of the heart. Gummata of the tongue, palate,

or pharynx may originate in the muscular tissue and secondarily involve the mucous membrane. They must be differentiated from malignant growths, or even tuberculosis.

Gummata grow slowly and without inflammation; they vary in shape and size, cause no pain, but, if large, interfere with motion; they occur late in the disease and are accompanied by other syphilitic manifestations.

As a general rule, they do not suppurate, but may become indurated and even be converted into cartilage or bone, thus accounting for the osseous masses, which are sometimes found in the muscles of old syphilitics.

THE SHEATHS OF THE TENDONS, THE TENDONS, THE APONEUROSES, AND THE BURSÆ.

Dorsal hygromata are firm, elastic, fluctuating tumors, which occur on the backs of the hands; they are triangular in shape, with their bases toward the fingers.

The lesion consists of a diffuse deposit of syphilitic material, with hyperemia of the sheaths and serous effusion.

They cause trifling pain, unless very large, when the skin may become tense, inflamed, and painful; they grow rapidly. They may appear in the early years of the disease in untreated cases.

The tendons of the ankle and foot may be similarly affected.

Gummatous tumors are sometimes found in the tendons, especially the larger ones, near their points of insertion and thicker portions. They are non-painful and may remain indolent for quite a time, then break down and form ulcers.

Tumors of the aponeuroses are more diffuse than those of

the tendons; their course is similar, but they are not so liable to degenerate.

As a rule, they attack the firm, dense fascia of the extremities, especially the fascia lata.

The Bursæ: In the secondary stage of syphilis there may be a congestion of, and a serous effusion into, the bursæ, especially in those most exposed to trauma.

In the tertiary stage also the bursæ may be attacked, especially the prepatellar bursa.

The lesion consists of a gummatous infiltration with connective-tissue formation. It begins painlessly, as a firm, hard, or elastic movable tumor beneath the skin; it may remain in this condition, or acute inflammatory symptoms may set in, causing ulceration of the overlying integument, owing to the occurrence of a "mixed" infection.

Syphilitic dactylitis consists of a gummatous deposit in the subcutaneous connective tissue of the fingers or toes and an infiltration and inflammation of their bones.

It belongs to the tertiary period of the disease and has two varieties.

In the first variety the subcutaneous connective tissue and fibrous structures of the joints are involved.

In the second variety the process begins in the bones and periosteum, attacking the joints secondarily.

In the first variety the lesion comes on slowly, and the patient's attention is first attracted by the enlargement of the finger or toe, which increases in size and becomes harder. The toes are generally affected in their entire length; but when a finger is attacked the lesion is usually limited to a single phalanx, although the whole member may be included (Fig. 126).

The finger or toe becomes red in color, resistant and tense;

the swelling is most marked on the dorsal aspect, and ends abruptly at the metacarpophalangeal articulation; it comes on slowly, and may or may not be painful.

Symptoms of joint-implication appear within a few weeks; flexion is impaired by the swelling; and if the condition be left untreated, the joint finally becomes abnormally mobile; sometimes there are hydrarthrosis and crepitation

Fig. 126.—Dactylitis. (Taylor.)

between the articular surfaces. This process may be limited to one or several members, and is a late manifestation of the disease.

The second form is limited to the bone, and is due to a specific periostitis or osteomyelitis. Its course is either rapid, slow, or intermittent. In the majority of cases the whole bone is involved, but the disease may be limited to the extremities of two opposing phalanges. The proximal

phalanx is more commonly involved than the distal one, and the fingers are more frequently attacked than the toes.

The process may affect several phalanges or fingers. The metacarpal and metatarsal bones can be attacked at the same time, or separately, but the metacarpal bones of the thumb and index-finger are most frequently involved.

The integument is but little affected, unless the swelling is considerable, when it becomes tense and thin; in some cases ulceration takes place, the inflammatory focus always being on the side of the finger.

Necrosis of the bone may occur, but, as a rule, resolution of the osseous swelling is the result. Bony crepitation may often be detected, owing to erosion of the articular cartilages.

Effusion into the joint sometimes occurs, but is not serious, as the fluid is usually absorbed. The mobility of the articulation may be impaired or rendered too free.

The shaft of the bone is either shortened or slightly elongated, but ordinarily the deformity is not marked.

Pain is very slight or entirely absent.

CHAPTER XXXI.

SYPHILIS OF THE BONES, CARTILAGES, AND JOINTS.

Osseous lesions may occur in the early months of the disease, but are usually late manifestations.

PRECOCIOUS OSSEOUS AFFECTIONS.

The bones of the cranium, the ribs, the sternum, the clavicle, and the tibiæ are the most liable to be affected. Of the skull, the frontal and parietal bones are the ones usually attacked.

The nodes or swellings vary in size from half an inch to an inch and a half in diameter, and may be half an inch in height; they are single or multiple, round, smooth, and hard. Similar lesions are liable to form on the inner surface of the cranium and give rise to cerebral symptoms.

The clavicle is generally attacked at its sternal extremity, the articulation being involved in some instances.

The upper third of the sternum is more frequently affected than the lower; the lesion may attack its borders and costal cartilages, and in this way set up a localized pleurisy. In severe cases the ribs are also invaded. Nodes are usually situated upon the subcutaneous surface of the tibia. The radius and ulna may be attacked, generally near the joints, the wrist more frequently than the elbow.

These tumors grow very rapidly, and are always accompanied by pain which is worse at night.

The lesion is due to hyperemia of the periosteum and new fibrous tissue formation. The nodes rarely break down into ulcers, but tend rather to spontaneous involution. They yield readily to treatment, or, if left alone, are converted into bony masses.

LATE OSSEOUS LESIONS.

These lesions do not necessarily occur in every case of syphilis. They may appear with the late secondary lesions or when every other trace of the disease has disappeared.

Osteoperiostitis.—In this affection the lesion consists of an increased vascularity of the periosteum and the underlying bone with an effusion and infiltration of either a fluid or gelatinous substance.

Any of the bones may be affected, but especially the tibia (Fig. 127), the ulna (Fig. 128), the clavicle, the sternum, and the cranial bones.

The process causes soft tumors of variable size, gradually shading into the surrounding tissue, attached to the bone, but not to the skin; sensitive on pressure and painful, especially at night. Such tumors are called nodes.

Under appropriate treatment these nodes undergo resolution; otherwise the skin becomes red, thin, and adherent to the tumor, which breaks down into an ulcer; this results in superficial necrosis with an adherent cicatrix.

In other cases the effusion is transformed into bony tissue, constituting an exostosis which, being movable upon the

bone beneath, is called an epiphysary exostosis; this form is due to periostitis, and such exostoses are generally small and thin.

FIG. 127.—Osteoperiostitis of tibia. (Bellevue Hospital.)

In other cases syphilitic exostosis is the result of osteitis, which results in hypertrophy of the bone; this form is called

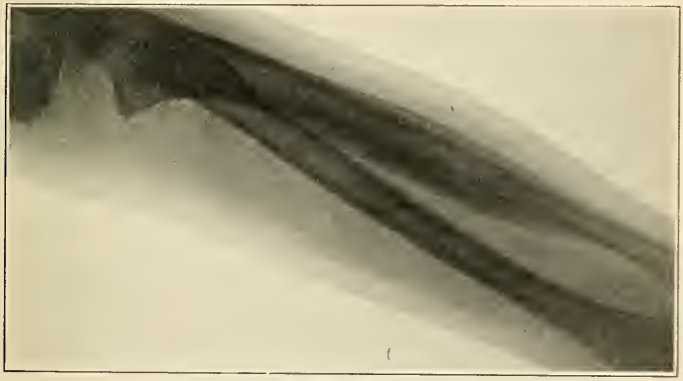


FIG. 128.—Periostitis of ulna. (Bellevue Hospital.)

parenchymatous exostosis; the new formation may be made up of either compact or cancellated tissue.

Exostoses may be situated on the inner surfaces of the

cranial bones and give rise to very serious cerebral symptoms. The frontal bone is most frequently affected in this manner. In rare instances exostoses are found in the vertebræ, sometimes external and sometimes within the spinal canal.

Osteomyelitis.—The deposit of syphilitic material generally takes place in the medullary canal of the long bones, but may occur in the periosteum or even in the substance of the bone itself.

The bones of the head are also liable to be affected, the syphilitic deposit occupying the diploë, thus separating the internal and external plates of the skull, and leading to caries or necrosis, and frequently to perforation, either internally or externally.

Necrosis of the Maxillary Bones.—This manifestation of the disease is most frequently seen in the hard palate and the alveolar process of the superior maxillary bones.

When the hard palate is affected, an abscess forms on the roof of the mouth near the median line, which finally ruptures and reveals exposed bone. After separation of the sequestrum an opening is left between the nose and the mouth which greatly interferes with articulation and deglutition, but which in time decreases in size quite markedly.

Necrosis of the alveolar process occurs in the upper jaw near the central incisors, and as the disease extends the teeth loosen and fall out.

THE JOINTS.

The joints may be involved during the secondary and tertiary stages.

Arthralgia.—Pain in the joints is frequently an early manifestation.

The lesion is a specific inflammation of the synovial membranes and fibrous tissues. The skin remains normal in all respects and there is no effusion into the joint; the only symptoms being pain, with sometimes slight stiffness of the articulation. The pain, which varies greatly, generally becomes worse at night.

Any of the joints may be attacked, but generally the larger ones, usually the knee.

In some cases the cartilages are invaded, giving rise to crepitation.

Synovitis.—There are two varieties of syphilitic synovitis; the first is a chronic effusion into the joints, without change in its structures; the second consists of effusion with thickening of the synovial membrane.

The first variety occurs in the early stage. The affection begins slowly and painlessly and consists of an effusion and some stiffness of the articulation. The integument is not involved. The effusion may be slight or copious, and, in properly treated cases, is rapidly absorbed, while in neglected ones it becomes chronic and very persistent. Suppuration or destruction of the joint does not occur.

During this process firm pressure may elicit some pain, otherwise there is none.

The second variety occurs late in the secondary and during the tertiary stage. The affected joint becomes slightly painful, enlarged, and its motion impaired. The effusion takes place slowly and is accompanied by thickening of the synovial membrane and fibrous tissue.

The lesion is due to gummatous infiltration into the synovial membrane. In some cases the cartilages become more or less eroded, thus giving rise to crepitation. There is but little tendency to complete ankylosis.

The knee-joint is the one most frequently affected.

CHAPTER XXXII.

SYPHILIS OF THE EYE.

The bones of the orbit may be attacked by either periostitis, caries, or necrosis, and present the same general symptoms as do similar lesions in the other bones.

The inflammatory process may extend from the diseased bones to the contents of the orbit, causing a cellulitis, which, if untreated, is liable to result in abscess and partial or complete destruction of the eye.

These lesions usually attack the orbital plate of the frontal and lacrimal bones.

Syphilitic nodes can form upon any part of the walls of the orbit and, if deeply situated, cause protrusion of the eye, with more or less interference of vision.

Affections of the lacrimal passages may occur at any period of the disease.

In some cases they are limited to the mucous membrane and submucous tissue and consist of catarrhal inflammation, with edema and ulceration. In the majority of cases the process begins in the bones or periosteum and involves the mucous membrane secondarily.

As the lacrimal passages become impervious, the tears collect upon the conjunctiva and flow over the face; purulent matter forms in the lacrimal sac and regurgitates, causing conjunctivitis and inflammation of the puncta lacrimalis. If the process be very severe, an abscess may form in the lacrimal sac.

Besides the thorough constitutional treatment to be described in Chapter XXXIV, the majority of cases require local measures. Applications of 50 per cent. mercurial ointment should be made, and even the following operative measure resorted to:

One or both canaliculi are incised as far as the caruncle, and dilated with a Bowman probe; this procedure affords great relief by making a free communication between the sac and the conjunctiva, and also by giving an outlet to pus or any material that has formed in the sac. If there be an obstruction in the nasal passages, due to edema of the mucous membrane, a probe should be passed every few days and left *in situ* for several minutes, thus restoring the original caliber of the canal.

The lacrimal gland may occasionally become involved.

The gland becomes swollen, pushing forward the upper lid, which, in turn, becomes red and inflamed.

Affections of the eyelids are not at all common; they are divided into eruptions, ulcerations, and infiltrations.

Eruptions may occur upon either the external or the internal surface of the lid, in the form of papules or pustules.

The initial lesion or chancre may be situated upon any part of either surface of the lid, but most frequently occurs at its free margin.

Beginning as a papular or superficial ulcer, it is soon surrounded by well-marked induration, with enlargement of the preauricular glands.

In the secondary period lesions of the lids occur as small, elevated, circumscribed spots of a grayish-red, yellow, or copper color.

Mucous patches are sometimes found upon the palpebral conjunctiva and resemble those situated elsewhere.

Ulcerations of the eyelid during this period generally commence as gummatous tumors or submucous infiltrations. They cause great destruction of the tissues and are generally situated upon the border of the lid.

Infiltrations between the cartilages and the integument do not always ulcerate, but may remain as nodules, which disappear under proper treatment.

The tarsal cartilages may become inflamed and thickened, causing edema of the lid, with or without redness of the integument.

The affection is very chronic and may result in loss of elasticity of the cartilage.

The tendons and fasciæ of the muscles of the eye may also be involved in the general specific inflammation, which is apt to lead to abscess formation and consequent destruction of the organ.

The ocular conjunctiva is rarely affected by syphilitic lesions but may be the seat of tubercles and gummatous tumors, and infiltrations. Cases of papules have been observed coincidently with a general eruption; the initial lesion is sometimes situated here.

Secondary ulceration may occur near the margin of the cornea; beginning as red, elevated spots, which soon ulcerate, and are liable to extend to the cornea.

Syphilitic ulceration of the cornea is a not uncommon manifestation. When the inflammation occurs it is usually in the substance of the cornea, and is designated as parenchymatous keratitis, of which there are two forms: the diffuse and the punctate.

Diffuse keratitis is generally accompanied by a varying amount of pericorneal injection and slight grayish opacity of the cornea, which after a time gives it the appearance

of ground-glass. As a rule, there is not much pain or photophobia at first, but these symptoms gradually increase in intensity and are accompanied by lacrimation.

Diffuse keratitis is the form generally observed in young children and is almost always due to hereditary syphilis.

Punctate Keratitis: The opacity occurs in sharply limited spots or points, which, as a rule, do not coalesce.

The lesion is gray or yellow in color and deeply seated.

Affections of the sclerotic coat are divided into episcleritis and parenchymatous scleritis.

Episcleritis generally begins as a hyperemic spot near the margin of the cornea, which, as the inflammation continues, becomes violet or purple in color. The conjunctiva is seldom involved, and then to a limited extent only. Any part of the cornea can be affected, and several spots may form at the same time and merge into each other.

There is usually but little pain, photophobia, or lacrimation with this process, which may, however, in some cases invade the cornea, the iris, or the ciliary body.

Parenchymatous scleritis is a very rare affection. As a rule, it commences by a zone of injection around the cornea, which is at first pink in color, but eventually becomes purplish. This pinkish zone gradually extends backward, covering entirely the anterior portion of the ball. This affection may run a chronic, painless course, or cause photophobia, severe pain, and lacrimation.

The iris may or may not be implicated.

The sclerotic coat is sometimes the seat of gummatous infiltration.

Syphilitic iritis is one of the most serious affections of the eye, and should be recognized early in order that proper treatment be employed.

It usually appears during the secondary period, but may occur much later.

There are three varieties of inflammation of the iris: (1) simple or plastic iritis; (2) serous iritis; and (3) parenchymatous or suppurative iritis.

Simple or plastic iritis is characterized by congestion of the iris, with the production of an exudation from it, and in some cases by an increase of the connective tissue. As a rule, there is injection of the conjunctival and sclerotic vessels. The color of the iris is changed, its surface is covered by a thin layer of fibrin, and on exposure to light it reacts slowly or not at all. The pupil may become irregular in shape, owing to the adhesions between it and the capsule of the lens, or to the exudations into its substance.

Serous Iritis: In this affection the exudation is serous in character, and is due to excessive secretion of turbid aqueous humor, which generally produces an increased intra-ocular tension; this causes deepening of the anterior chamber and dilatation of the pupil from pressure. Circumcorneal injection may be absent or present. Adhesions between the lens and the iris are very rare in this form.

Parenchymatous or Suppurative Iritis: In this form of iritis there is inflammation in the stroma of the iris, causing edema of the membrane and increase in its cellular tissue elements. Elevations, also called tubercles, or condylomata, occur upon the surface of the iris, and in composition are identical with gummy tumors. The vessels of the membrane are congested from retardation of their circulation. Adhesions between the margin of the pupil and the lens are very common. Pus is produced rapidly and abundantly in the anterior chamber.

Pain and photophobia may be very severe, or in some

cases entirely wanting; vision is always more or less interfered with.

If the affection be early and properly treated, the eye returns to its normal condition; but in cases that are neglected, permanent adhesions form, which impede the motion of the iris.

The patient should be kept in a shaded but not darkened room, going out, if at all, in the evening, to avoid the glare.

The constitutional treatment to be described later should be begun immediately.

To prevent the formation of adhesions between the iris and the capsule of the lens, the pupil must be kept constantly dilated with a solution of sulphate of atropin (2 grains to the ounce of distilled water), this being dropped in two or three times daily; it also relieves the pain and irritation. If the iris does not yield to the use of atropin, mercurial inunctions may be made over the brow and temple. But if these measures, combined with vigorous constitutional treatment, fail to relieve, evacuation of the contents of the anterior chamber by paracentesis corneæ may have to be resorted to.

For chronic iritis, constitutional treatment is usually all that is required for relief.

If, however, in spite of all treatment, the aqueous humor becomes very cloudy, the pain increases, the tension becomes greater, there is a decrease of vision, or if pus forms in the anterior chamber, then paracentesis should be performed; but if the disease still progresses, with an increase of all the above symptoms and extension of the inflammatory processes to the deeper structures of the eye, then iridectomy must be resorted to.

Primary cyclitis, or inflammation of the ciliary body, is

very rare. It usually follows affections of the iris or the choroid.

The symptoms are intense pericorneal injection at one or more points, opposite any one of which there is retraction of the iris.

Gummata are also sometimes found in the ciliary body.

Choroiditis occurs in three forms: (1) plastic choroiditis, or choroiditis exudativa; (2) serous choroiditis; and (3) parenchymatous choroiditis.

Plastic choroiditis, or choroiditis exudativa, is characterized by the formation of an exudation upon the surface and in the substance of the choroid.

The exudation appears like yellowish-white or straw-colored spots, over which run the retinal vessels. These spots may be absorbed and leave no trace of their existence, but usually the exudation disappears, leaving atrophic changes in the choroid, which becomes greatly thinned and allows the sclera to be seen, thus giving a white, glistening appearance to the previously yellow spots.

Serous choroiditis is characterized by the exudation of a serous material from the choroidal membrane.

Parenchymatous choriditis consists of a deep-seated inflammation with hypertrophy of the cellular tissue, forming little gummy tumors which project into the vitreous humor.

Syphilitic choroiditis usually develops in the late secondary or the early tertiary period.

Retinitis, or inflammation of the retina, is marked by increased vascularity and opacity of the membrane, due to effusion into its substance.

It usually begins by redness of the optic nerve entrance or by slight edema, which obscures the underlying structures. The retinal vessels become enlarged, tortuous, and sometimes

rupture, forming spots of ecchymosis. The deposits of lymph in the retina cause light-colored patches, beneath which pass the vessels of the choroid and the retina.

Retinitis is rather an uncommon manifestation and generally occurs quite late in the disease.

Optic neuritis, unless following an inflammation of the retina or choroid, is very rare, but does occur.

The ophthalmoscopic appearances of specific and non-specific neuritis are the same.

Syphilitic paralysis of the nerves of the eye is a not uncommon manifestation of the disease and attacks most frequently the third pair, or motor oculi; next the sixth pair, or abducens; and finally, the fourth pair, or patheticus.

Paralysis of the third pair causes ptosis, external strabismus, immobility of the ball, diplopia, and mydriasis.

Paralysis of the sixth pair gives rise to internal strabismus.

Paralysis of the fourth pair is followed by a loss of power of rotation of the eye-ball on the affected side.

Sometimes only certain branches of a nerve are involved, or different nerves of both eyes may be affected simultaneously.

CHAPTER XXXIII.

SYPHILIS OF THE EAR.

The external ear may be the seat of macules, papules, and gummata, although their occurrence in this situation is not at all common.

The external auditory canal is sometimes, but not very commonly, the seat of mucous patches and condylomata; they are either isolated or merged together and may completely occlude the canal, causing quite severe pain.

Ulcers are sometimes situated on the walls of the external meatus; they are rounded in form, and very painful, and begin as circumscribed inflammations or gummatous tumors which may break down and suppurate.

The middle ear is that portion of the organ which is most frequently affected in syphilitic subjects on account of its intimate connection with the throat, from which any syphilitic affection may extend, and in which place syphilitic lesions are so common.

Mucous patches may be situated in the Eustachian tube or upon the walls of the middle ear.

The sequelæ of these affections may be thickening or destruction of the drum, loosening of the ossicles from their attachments, or caries of the temporal bone or ossicles.

The mastoid cells may also be involved as in ordinary suppurative otitis media.

Stricture or complete occlusion of the Eustachian tube may follow an acute, severe invasion of syphilis.

Hypertrophy of the lining membrane, membranous bands, polypi, or hyperplasia of the osseous tissues, cause impairment of hearing, according to their degree of development.

In cases of severe inflammation of the tympanum there may be congestion, or even extravasation of blood into the internal ear.

Disease of the labyrinth usually appears at the end of the secondary stage and may either follow disease of the middle ear or occur primarily.

Cases of sudden deafness, due to syphilis, may occur during both the secondary and tertiary stages. As a rule, both ears are affected simultaneously.

There is a feeling of fulness in the ear, but no pain; the patient has vertigo and sometimes a staggering gait.

The attack is preceded by hyperemia of the drums, which afterward become opaque, lustreless, and only slightly, if at all, injected; there is no sign of fluid in the middle ear. The Eustachian tube remains open and the fauces may or may not be affected.

CHAPTER XXXIV.

CONSTITUTIONAL TREATMENT OF SYPHILIS.

The constitutional treatment of syphilis consists in the combined use of mercury and salvarsan or neosalvarsan, with the addition of iodide of potash in certain manifestations of the disease.

During the entire course of treatment the patient's general condition must be most carefully watched and regulated by the employment of proper hygienic measures and other medication, as indicated.

Syphilitic patients should lead moderate, temperate and regular lives, with nourishing and readily digestible diet.

A little ale or beer can be taken at lunch, and a glass or so of sherry, claret, burgundy, or white wine with dinner; champagne is harmful, as are also brandy and spirits, and these should therefore not be allowed, especially on an empty stomach. Drinking between meals should be forbidden.

Smoking may be permitted in great moderation, provided there is no irritation of the nasopharyngeal mucous membranes, and that none results from the use of the tobacco.

It is important that there should be at least one free evacuation of the bowels every day. Moderate exercise in the fresh air and sunshine must be insisted upon, as well as daily bathing in either warm or cool water, whichever is preferred; as by these means the secretory apparatus of the

skin is kept functionating normally, which is very essential in these cases.

Russian and Turkish baths are beneficial in some cases, as are also plain hot, salt, or sea baths, provided they are taken in moderation, and not followed by the cold plunge, or shower, the shock of which is very harmful and even dangerous during the first month or so of the disease; the bath may be followed by massage. Surf bathing should never be allowed during the early months.

In the primary stage of the disease—that is, before the appearance of the roseola or macular rash, the patient's general health must be thoroughly investigated, and he or she put in as good physical and mental condition as possible. The teeth and gums, as well as the mucous membrane of the nose, mouth, and throat, and also that of the entire gastro-intestinal tract, should be carefully and systematically examined, and put in thorough order, as congested mucous membranes, rough, dirty, and decayed teeth, and spongy gums cause more or less local irritation, which is the prime factor in the production and persistence of mucous patches, and is in many cases the underlying cause of salivation, when mercury is administered.

The condition of the kidneys should always be investigated at this time, in order to enable us to differentiate between an ordinary, preëxisting nephritis and that possibly due to the administration of mercury or arsenic. Should nephritis be present, these remedies must be administered with extreme care.

Should anemia develop, as it may in the primary and the early part of the secondary stages, hematogenous drugs must be administered, such as iron and strychnin, and, if indicated, arsenic.

Before the use of salvarsan or neosalvarsan it is always imperative also that the eyes be carefully examined, to see that the fundus and optic disks are normal, as these structures are very susceptible to arsenic-containing drugs.

ADMINISTRATION OF MERCURY.

In using mercury it must not be forgotten that in certain instances it is apt to cause such disagreeable complications as salivation, stomatitis, and gastro-intestinal disorders, but fortunately such complications at the present time are very rare indeed, as the doses employed are exact, the preparations more carefully selected, and the gums, teeth, and mucous membrane put in good order when the disease is first diagnosed.

Mercury may be administered by the mouth, by inunction, by intramuscular injection, or by fumigation.

Internal administration: If the drug is to be administered in this manner, the best preparations are the biniodide, protoiodide, or the tannate of mercury, given in pill form, and often combined with iron and arsenic.

The dose of the biniodide or protoiodide is from a quarter- to a half-grain, three times a day; while that of the tannate should be from a half-grain to a grain.

If so desired, the salicylate or thymolacetate of mercury may also be used in pill form, in from half- to even three-quarter-grain doses; practically, however, these preparations have no advantages, nor are they even as efficient as those previously mentioned.

It must be remembered, moreover, that the *internal* administration of mercury is much more liable to cause salivation and gastro-enteritis than the inunctions or injec-

tions, to which it is *far inferior* in every respect as regards the ultimate cure of the patient, and that it is now practically a thing of the past, never to be used unless it is, for some reason, absolutely impossible for the patient to take any other form of treatment.

Inunction: This is the most efficacious and rational mode of administering mercury, as by the inunction method we obtain not only the constitutional, but also the local, action or effect of the drug, and at the same time spare the stomach. The best preparation is a 50 per cent. mercurial ointment made with fresh lard.

The part to be rubbed should be thoroughly cleansed with alcohol. A fresh portion of integument is selected each time, and rendered clean as above described, as in this manner irritation of the integument (dermatitis) is in a great measure, if not wholly, prevented.

For each inunction or rubbing from twenty-five to sixty grains or more of the ointment are used, which is carefully weighed and put up in oiled papers or gelatin capsules, thus making the method an exact and accurate one as to the amount of drug used at each rubbing. The inunctions are best given by a professional rubber, although patients can rub themselves, if necessary. The average healthy adult will take about sixty grains of the 50 per cent. ointment at a rubbing, although there are some who can go as high as seventy-five and even eighty grains.

Each rubbing should occupy from twenty to thirty minutes in order that the ointment may be well rubbed in, which leaves the skin of a grayish color, and not markedly greasy to the touch.

If the inunctions are given in this thorough manner, the treatment is not as irksome as it is described by some writers;

in my own practice I experience little or no difficulty from patients on this score when this method is employed.

To protect the clothing, these patients can wear the thinnest kind of underclothes over the part last rubbed.

A course of inunctions consists of eleven rubbings, given on the following regions, into which the body is divided, so that at the end of each course the entire body has been treated, with the exception of the scalp and face, both of which can be rubbed on alternate nights with ammoniated mercurial ointment if so desired.

Region 1. The entire neck, well up to face and hair-line, and down to clavicles.

Region 2. The right shoulder, arm, forearm, and hand (dorsum and palm).

Region 3. The left shoulder, arm, forearm, and hand (dorsum and palm).

Region 4. Right half of chest and abdomen (from clavicle to groin, and from median line to axillary line).

Region 5. Left half of chest and abdomen (from clavicle to groin, and from median line to axillary line).

Region 6. Right half of back (from root of neck to buttock, and from median line to axillary line).

Region 7. Left half of back (from root of neck to buttock, and from median line to axillary line).

Region 8. Right thigh and groin.

Region 9. Left thigh and groin.

Region 10. Right leg and foot (dorsum and plantar surface).

Region 11. Left leg and foot (dorsum and plantar surface).

The rubbings should be given *every other* night, the first one not being washed off until just before the second one is administered, and so on throughout the entire course.

When one course of inunctions is finished (11 rubbings), treatment should be stopped for a few days and then resumed in the same regional manner as above described, the integument being thoroughly cleansed by hot soap-and-water baths, during this period of rest.

For rubbing the scalp and face, we employ the white precipitate or ammoniated mercurial ointment on account of the bluish-black color of the mercurial ointment. These parts are rubbed two or three times a week during the early secondary stage.

Fumigation.—Fumigations are undoubtedly of great value in certain of the chronic, the localized, and especially the scaling and ulcerating, eruptions of syphilis, but must not be employed as a routine method of constitutional treatment.

The mercurial vapor is best generated from calomel and cinnabar placed on a Lee fumigation lamp.

These treatments may be taken at home or at a regular bath establishment, whichever the patient prefers; the physician always prescribing the amount of drug to be used at each bath, and never leaving it to the discretion of the attendant.

The purest calomel and cinnabar (red sulphide of mercury) must be employed, and the body or the part to be acted upon thoroughly washed, before the bath is given. The bath should be taken at night just before retiring, and about twenty grains of calomel and forty grains of cinnabar used; these are mixed and placed on the lamp.

The patient, undressed and covered with blankets, sits on a cane-bottom chair, beneath which is the lamp; in a few minutes profuse perspiration comes on, the drugs being completely volatilized in about twenty minutes, during which time steam is also produced from the water bath on the

lamp, which is then extinguished. The patient remains on the chair a few minutes longer, and then retires in the same blanket, without being rubbed.

The bath may be given every night, or one to three times weekly, according to the strength of the patient and the amount of mercurial effect desired. The patient should be very careful not to catch cold after the treatment.

While this method is of undoubted value in the type of lesions mentioned, it is now practically obsolete, owing to the readiness with which these lesions respond to the intravenous injections of salvarsan and neosalvarsan, combined with mercury. It is described here, therefore, rather for its historic interest than as a practical method.

Intramuscular injections: The treatment of syphilis by intramuscular injections of mercury is very efficient; but its general adoption as a routine method of constitutional treatment cannot be recommended, as the injections are followed by more or less pain, soreness, indurated nodules, and in some rare cases by abscess formation.

The preparations of mercury used may be either soluble or insoluble. Of the former the best is the bichloride in sterile, watery solution, ten minims containing $\frac{1}{4}$ grain. The dose used varies from $\frac{1}{12}$ to $\frac{1}{4}$ or even $\frac{1}{2}$ grain, every three to five days.

Of the insoluble preparations the salicylate is the best. It is put up for use in the form of a 10 per cent. suspension in sterile albolene, so that 10 minims equal 1 grain. The dose is from $\frac{3}{4}$ grain to 1 grain every five to eight days. The mixture must be thoroughly shaken just before use.

The injections are given with an all-glass (Fig. 129) hypodermic syringe, and a platinum needle about an inch and a quarter long.

The site of the injection is sterilized by painting it with tincture of iodin and washing with 95 per cent. alcohol. The syringe and needle are boiled and the surgeon's hands scrubbed and cleansed as for any operation.

The patient should lie on his side or abdomen, with muscles relaxed. The needle is inserted at right angles and deeply into the muscle and the solution injected slowly; the needle is then carefully withdrawn, and the puncture wiped off with alcohol. No dressing of any sort is required, but the injection site should be massaged with sterile gauze for a few moments.

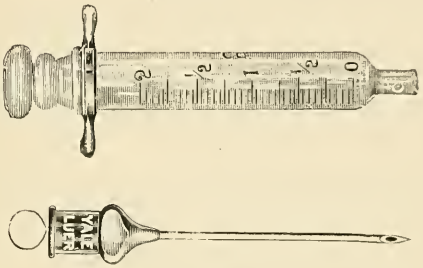


Fig. 129.—All-glass syringe and needle for intramuscular injections.

The best place for making the injection is into the upper and outer part of the buttock.

Iodide of Potash.—While probably not possessed of any direct effect upon the Spirocheta pallida itself, the iodide of potassium is a very useful adjuvant to combine with mercury and salvarsan or neosalvarsan, as it hastens elimination and assists greatly in the breaking down of syphilitic deposits wherever they may occur. It finds its greatest field of usefulness, therefore, in the treatment of late secondary or of tertiary lesions, and in most cases is best given in the later stages of the disease.

The dose of the iodide of potash in the beginning should be from about five to fifteen grains, three times a day, an hour after meals. This may be increased gradually to one hundred or even more grains daily.

It is best to begin with very small doses, diluted in water, or mixed with essence of pepsin, elixir of lactopeptine, or milk of magnesia.

In some instances it causes coryza, pain in the frontal sinuses, edema of the conjunctiva, swelling of the lids, irritation of the fauces, gastro-intestinal derangements, or eruptions on the skin, most commonly papules, acne pustules, or furuncles, which, as a rule, are situated upon the face, the neck, and the back.

In large and long-continued doses, iodide of potassium may sometimes give rise to a condition known as iodism, which consists of a feeling of oppression in the head, tinnitus aurium, neuralgia, spasmodic muscular action, impairment of voluntary motion, and sluggish intellect.

All the above complications rapidly subside on the temporary suspension of the drug.

Mixed Treatment.—By the "mixed treatment" is meant the internal administration of potassium iodide and mercury in combination.

The indications for the use of the "mixed treatment" are the same as for the internal treatment by pills, already mentioned. In other words, this method of administration should *never* be resorted to except under conditions which absolutely preclude the use of inunctions or intramuscular injections of mercury and the intravenous administration of the new arsenical preparations.

The following prescription for the "mixed treatment" is a good working formula, but may have to be somewhat

modified according to the susceptibility of the patient and the requirements of each individual case.

℞—Hydrarg. biniodid., gr. j-ij-iij-iv
Potass. iodid., ℥ij-℥ss-℥j-℥ij
Tinct. gent. co., ad ℥iv—M.
Sig.—℥j to ℥ij in a wineglass of water, one to two hours after each meal.

Zittman's Decoction.—There is always a small percentage of patients who, after undergoing antisyphilitic treatment with mercury and iodides for a varying length of time, begin to show signs of anemia and defective elimination, or by whom the regular antispecific remedies are no longer well borne. In these cases the use of the following modification of Zittman's decoction is often followed by marked improvement, the cathartic and tonic action of the mixture making it possible for the patient to resume regular antiluetic treatment.

℞—Alum pulv., ℥ss
Fl. ext. sarsaparill., ℥ij
Glycerini, ℥j
Syr. sennæ, ℥iss
Sp. anisi, ℥j
Fld. ext. glycyrrhiz., ℥j
Aq. fœniculi, ad ℥viij—M.
Sig.—℥j in a glass of water after meals.

During the time that this treatment is being employed patients should drink freely of any bland water.

Salivation.—During a course of mercurial treatment some subjects are liable to become salivated, especially those with bad teeth and spongy gums, which conditions should have been corrected in the primary stage of the disease.

The first symptom of salivation is soreness of the gums just behind the superior incisors, and in the lower jaw back of the last molars; the other symptoms are a metallic taste in the mouth, fetid breath, increased flow of the saliva,

tenderness of the teeth when closed upon each other, swelling of the tongue, which is marked by the teeth on its sides, edema of the mucous membrane of the cheeks, gums, and lips, with difficulty and pain in articulation and deglutition. In some cases the neighboring lymphatic glands may become enlarged and tender. Sometimes there is fever and diarrhea, accompanied by general malaise. In some very rare, extreme and neglected cases there is ulceration of the soft parts, which may or may not be followed by necrosis of the maxillary bones.

Treatment.—The mercurial treatment must be stopped immediately, the bowels freely opened with saline cathartics, and the patient given a hot soap bath, especially if taking inunctions or fumigations. The diet must be liquid and nourishing. For a gargle and mouth-wash we can use solutions of chlorate of potash and alum, with tincture of myrrh, which must be employed frequently. The line of juncture of the teeth and gums may be painted with equal parts of tincture of iodin and tincture of myrrh.

In those cases in which the teeth and gums have been neglected, and are therefore in a dirty and spongy condition, thorough cleansing, at frequent intervals, with absorbent cotton on an applicator or a soft brush, is very useful.

These patients must be kept in the open air and sunshine as much as possible and given tonics as indicated, with plenty of easily digestible, nourishing food.

ADMINISTRATION OF SALVARSAN AND NEOSALVARSAN.

The successful administration of salvarsan and neosalvarsan requires a careful technic, but one which is neither complicated nor difficult to master.

We shall first describe the administration of the newer preparation, neosalvarsan, as the steps in the procedure are simpler than, though similar to, those used in injecting salvarsan, and will make it easier to understand the administration of the latter.

Neosalvarsan may be administered either intramuscularly or intravenously.

The intramuscular method is far inferior to the intravenous, and is never employed by the author. With it both the absorption and the elimination of the drug are slow and uncertain; the procedure is no safer, and the injections are always followed by more or less pain, by edema, and by the formation of large, tender nodules in the tissues. In many cases the pain and swelling are so severe as to confine the patient to bed.

The method of intravenous administration employed by the author is as follows:

The necessary apparatus consists of two graduated glass jars or burettes, having a capacity of 50 c.c., resting in a suitable holder and coupled together by glass and rubber tubing, and a three-way stopcock, as shown in Figs. 130 and 131. By means of the three-way cock, fluid may be drawn from either jar alternately, as desired.

In place of the burettes some operators use Record syringes of about 20 c.c. capacity, but the writer prefers the jars, as the fluid then enters the circulation by force of gravity only, and the pressure can be much more easily regulated.

The common outlet tube, leading away from the three-way cock, ends in a metal nozzle which fits accurately into the socket of the needle through which the injection is made.

There are various models of needle on the market; the

author's preference being for the Schreiber needle, shown in Fig. 132. Needles must be sharp and free from rust,

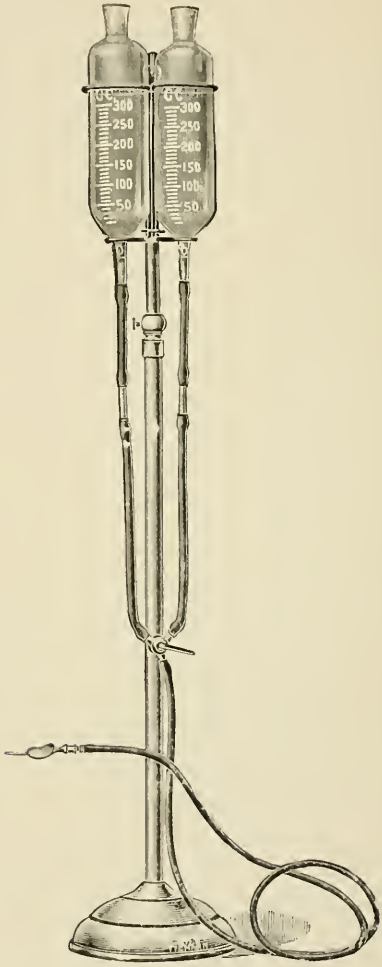


Fig. 130.—Salvarsan gravity apparatus.

both inside and out, to avoid the risk of laceration of the vein and clogging of the flow of the drug. For this reason they should not be used more than once or twice, as corrosion is very liable to occur in old needles. The most useful calibers are 18 and 20; 18, the larger, for especially large and prominent veins, and 20, the smaller, for the average

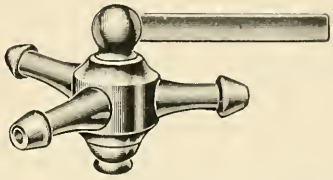


Fig. 131.—Author's three-way stopcock.

man and for women and children. New needles should be thoroughly washed out with alcohol, before sterilization, to remove all traces of the oil with which they are often filled.

The burettes, tubing and needle must be sterilized by boiling and then allowed to cool down to room temperature

Fig. 132.—Schreiber needle.

before use. The two jars are then filled with sterile, freshly distilled water, at room temperature, enough of which is run out, by manipulation of the stopcock, to completely fill the tubing and insure the exclusion from it of all air bubbles. The water in one jar is then run out, down to the mark zero, while the other jar is refilled to its full

capacity. Except for the addition of the solution of neosalvarsan the apparatus is now ready for use.

The preparation of the patient should begin the day before. He should undergo a careful physical examination, which should include a urinalysis, a Wassermann reaction, if he has not lately had any antisyphilitic treatment, and an examination of the eyes, ears, nervous system and heart and lungs. Alcohol should be avoided for at least twenty-four or forty-eight hours. Dinner, the night before, and breakfast, on the morning of administration, must be very light and easily digestible. The use of tobacco, for twelve hours before, is also to be forbidden. The bowels should be opened, preferably by compound cathartic pills, in the evening, and a saline, in the morning. The patient should rest for at least a half-hour before receiving the injection, and should drink water very freely both before and after.

The apparatus having been prepared, as described above, the patient now lies down on an operating table, with head and shoulders somewhat elevated, and allows both arms to hang down over the sides of the table, so as to distend the veins with blood. That arm is selected for the injection in which the superficial veins are most prominent. The usual site is into the median basilic or median cephalic vein, but any vessel which is sufficiently large may be selected. The site having been decided on, an area of several square inches about the point of puncture is sterilized, either by washing with soap and water, followed by bichloride solution, or by painting with tincture of iodin and washing with alcohol. The arm is then covered with a sterile towel and left, thus protected, in a dependent position until ready for injection.

The ampoule containing the drug, sterilized by soaking

in alcohol, is now wiped dry and opened, by scratching and breaking off the neck with a sterile file, and the entire contents, a yellowish powder, dissolved in 15 to 20 c.c. of cold, *freshly distilled*, sterile water. When the drug is completely dissolved the solution is poured into the empty burette, and we are ready to proceed with the injection.

The patient having been instructed to lie very still and to hold the forearm supinated, with the fist clenched, in order to make the veins of the forearm as prominent as possible, a tourniquet of rubber tubing is applied two or three inches above the elbow, with the limb still hanging down. The arm is then supported, in a sloping position, by sand-bags covered with sterile towels. As soon as the selected vein is well distended the operator, holding the needle so that his thumb rests in the concavity of its curve, plunges its point through the skin over the vein and then into the vessel itself. The fact that the vein has been entered is shown by a flow of blood through the needle.

The tourniquet is immediately removed, slowly and gently, to avoid jarring the limb, and the assistant starts water flowing from the water-jar, at the same time handing the end of the tubing to the operator, who fits it into the socket of the needle, taking care that both blood and water are flowing freely at the time the coupling is made, to avoid the entrance of air bubbles.

If the fluid flows freely into the vein, without causing any pain or distention in the perivascular tissues, we know that the needle point is not only in the vessel, but that it has not lacerated its wall, so as to permit of leakage through it. Should smarting or swelling occur, however, the needle must be withdrawn and inserted elsewhere, and the process repeated, for while the escape of water into the tissues is

quite harmless, that of the drug is followed by more or less severe local reaction, which, in the case of salvarsan, is even liable to go on to tissue necrosis. Where leakage of even distilled water occurs the arm should be dressed, after the injection is finished, with a wet dressing of aluminum acetate or weak bichloride solution.

If the flow of water is free, however, the drug is turned on; and when the required amount has been injected a few cubic centimeters of water are again run through to wash into the vein any of the neosalvarsan solution remaining in the tubing. The needle is then quickly withdrawn and a pad of sterile gauze fastened over the site of puncture with a little adhesive plaster. This can be removed in twenty-four hours.

The administration of salvarsan is somewhat more complicated than that of neosalvarsan, owing to the fact that solutions of it in distilled water are acid, instead of neutral, and therefore require to be alkalinized by the addition of sodium hydroxide, and also because much less concentrated solutions can be used. The burettes therefore must be of 300 c.c. capacity, instead of 50.

The duration of the injection, as a result, is from ten to twenty-five minutes, instead of one or two minutes, as is the case with neosalvarsan.

The alkaline injection solution is prepared as follows:

Into a 300 c.c. sterile, glass-stoppered graduate pour the contents of an ampoule of salvarsan and 40 c.c. of fresh sterile 0.5 per cent. sodium chloride solution prepared from freshly distilled water. Shake vigorously until the drug is *completely* dissolved. To this clear, acid solution must be added, according to the amount of salvarsan present, a certain number of drops of a 15 per cent. solution of sodium

hydroxide, made up with sterile distilled water. About four drops of this solution are usually required for each 0.1 gm. of the drug; thus:

Salvarsan.		Solution of sodium hydroxide (1½—Purified sodium hydroxide 1.5 grams Distilled water . . . . 8.5 c.c.)		
0.6 gram	=	approx. 1.14 c.c.	=	approx. 23 to 24 drops.
0.5 "	=	0.95 c.c.	=	19 to 20 "
0.4 "	=	0.76 c.c.	=	15 to 16 "
0.3 "	=	0.57 c.c.	=	12 "
0.2 "	=	0.38 c.c.	=	8 "

The requisite number of drops having been added to the solution in the graduate, this is shaken up again to redissolve the precipitate which results from the addition of the alkali. When the solution is once more perfectly clear we then add sufficient 0.5 per cent. sodium chloride solution, sterile and made up with freshly distilled water, to make a total volume of 50 c.c. to every 0.1 gm. of salvarsan present (*e. g.*, 0.5 gm. should be contained in a total volume of 250 c.c.). If the solution is clear, it is now ready for administration; should it become slightly cloudy, however, after standing for a few minutes, we must add more sodium hydroxide solution, a drop at a time, waiting two or three minutes after each drop, to give the cloud time to disappear.

When a perfectly clear solution has been obtained the drug is administered precisely as is neosalvarsan, except that the jars of the apparatus are of 300 c.c. capacity and that more time is required, owing to the larger volume of fluid.

As stated at the beginning of Chapter XXXIV, the complete treatment of syphilis includes the combined use of salvarsan or neosalvarsan with mercury and iodide of potash. The methods of administration of these drugs have

now been discussed, and it only remains to indicate how they may best be combined and how long the treatment should continue.

Before the treatment is begun the patient should be thoroughly examined as to general condition, weight, blood-pressure, condition of the urine and habits and mode of life. This done, the more rapidly he can be put on active anti-syphilitic treatment, both constitutional and local, when the latter is indicated, the better.

While no hard-and-fast rules can be laid down as to dosages or duration of treatment, in a general way it may be said that while, with the use of salvarsan and neosalvarsan, the prospects for complete cure are far greater than formerly, yet, at the same time, the duration of treatment should, as before, be not less than two years, and longer, if possible.

During the first year the patient should receive six to eight intravenous injections of salvarsan or ten to twelve of neosalvarsan, given at intervals of seven to ten days, depending on the condition of the kidneys. The initial dosage should be about half the possible maximum, the latter being reached at the second or third injection, if no untoward results follow the first. At the same time the patient should begin taking inunctions of mercurial ointment, 50 per cent., as described above, at such a rate that, at the end of the first year, ten to twelve "courses" have been taken.

Iodide of potash should be given, in increasing doses, up to the limit of tolerance, after about the second or third month of treatment.

In the second year the course to be followed is similar to the above, but less drastic, and with longer intervals of rest from medication.

Occasionally, in those cases that react poorly to treatment, in whom digestion and elimination are faulty, the administration of the modified Zittman decoction, described on p. 325, will be followed by great improvement in the patient's general condition and an increased ability to take vigorous antisyphilitic treatment.

The Wassermann Reaction.—It is not worth while to test the complement-fixation reaction until after the end of the second year. After that time, the patient having gone six or eight weeks, at least, without any treatment, a test can be made, which, if negative, should be repeated at intervals of a few months. If a succession of negative reactions is obtained, over a period of years, we can then feel reasonably certain of the patient's having been cured, provided, of course, that he has also been completely free from symptoms during that time.

It is well to remember, here, that some cases prove more refractory to treatment than others, and that the two years' course outlined above represents the minimum duration and may, in many cases, require to be greatly extended.

CHAPTER XXXV.

HEREDITARY SYPHILIS.

Hereditary or congenital syphilis is that form of the disease in which it is transmitted to the fetus *in utero* from either one or both parents.

As a general rule, symptoms appear about the third week of life, but they are sometimes observed at birth, or even as late as puberty or early adolescence.

If both parents are syphilitic the fetus is often stillborn, or the child may manifest symptoms at birth.

The severity of the disease decreases with each succeeding child, and is in proportion to its intensity in either one or both parents at the time of its conception. It is usually only transmitted to the second generation, although, of late years, a number of instances have been reported, in which the disease was apparently transmitted to the third generation.

There is no initial lesion nor are there any regular stages in hereditary syphilis; the lesions are usually more hyperemic and active than in the acquired form, and attack every organ and tissue in the body.

In hereditary syphilis there is no general adenopathy, as in the acquired form, although groups of glands may be enlarged, according as they are in relation with active lesions.

Hereditary syphilis may be derived from either one or

both parents. If procreation occurs while the father is in the first period of incubation the child will escape infection, and may do so even if he be in the second period of incubation, but is usually infected if he has secondary manifestations, although constitutional treatment may so modify the disease in the father that the child will escape, even during the first year.

The father transmits his disease through his sperm cells, which come in direct contact with the ovule of the female at time of fecundation.

The mother may also transmit syphilis to the fetus, but her disease must be constitutional, as at that time her ovule is syphilitic, and the fetus is thus infected at the time of fecundation. The disease of the mother may be so modified by constitutional treatment that the child will escape infection.

In those cases in which the father and fetus are both syphilitic and the mother apparently healthy, though refractory to syphilitic infection, it can now be shown by the complement-fixation test that the disease is really present in the mother also, but in a condition of latency.

The syphilis of the mother, acquired during pregnancy, may be conveyed to the fetus through the uteroplacental circulation, and the mother may also be infected by a syphilitic fetus through the uteroplacental circulation.

The course of the disease is chronic and very irregular in character in those cases where treatment is inadequate. Cutaneous, mucous, and visceral lesions may be present at the same time.

The duration of hereditary syphilis depends upon the intensity of the disease and the treatment employed. The lesions respond as readily to modern treatment as do those

of the acquired form of the disease, but it is particularly difficult, in hereditary syphilis, to render the Wassermann reaction negative and keep it so.

The mortality of syphilitic children, although quite high, is not as great as in former years, owing to the improved methods of treating the parents, as a result of which the fetus may even escape infection, or, if infected, the disease itself be rendered less severe.

Abortion.—Syphilitic women are very liable to abort, and generally do so between the fifth and seventh months unless adequately treated. Abortion caused by the death of the fetus takes place at about the sixth month. The fetus is usually macerated, of a purple color, with various visceral lesions and bullæ upon the soles and palms.

Syphilitic stillborn children, or those dying soon after birth, frequently have no cutaneous lesions, but have a peculiar senile appearance.

The majority of syphilitic children born alive look perfectly healthy, but at about the end of the third week the disease manifests itself; some, however, exhibit cutaneous lesions at birth.

Prognosis.—The prognosis of hereditary syphilis is usually unfavorable, but depends greatly upon the condition of the parent or parents at the time of conception, the intensity of the disease in the child, and whether the infant and the infected parent or parents have received proper antisyphilitic treatment for a sufficient length of time.

The prognosis should therefore always be made in a guarded manner, and after a careful weighing of the above stated considerations. It is, however, not now as unfavorable as in former years, owing to our improved methods of treatment, not only of the parents, but also of the child itself.

CHAPTER XXXVI.

LESIONS OF HEREDITARY SYPHILIS.

THE SYPHILIDES.

The commonest eruptions of hereditary syphilis are the erythematous, the papular, the vesicular, the pustular, the bullous, and the tubercular syphilides.

The erythematous syphilide, or roseola, is the first eruption, and appears about the third week of life; it may be preceded or accompanied by coryza. Beginning upon the lower portion of the abdomen as pink spots, the eruption finally invades the trunk, the face, and the extremities; the spots gradually assume a dull red, coppery color, which does not disappear on pressure, owing to the pigmentation of the skin. As a rule, there is no elevation or desquamation of the spots, except in severe cases, or when they are situated upon the palms, the soles, or the nates. In some instances the spots coalesce, forming fissures which may or may not be painful. The eruption may be so faint in some cases as to escape observation.

The Papular Syphilide.—This syphilide is sometimes the first to appear, or may be intermingled with the erythematous eruption. The lesion consists of large and small, flat papules, scattered over the body. Grouping is infrequent except at a late period, and then occurs about the joints and on the extremities. The papules are coppery red in color, and may exfoliate, especially when situated upon the palms or soles.

Condylomata lata are really nothing more than modified papules, which, being situated between opposed surfaces of skin, at mucocutaneous junctions, or wherever there is moisture, become hypertrophic. They vary in size and shape, are of a grayish-pink or brown color; the surface is flat, sometimes fissured and ulcerated, with an offensive and highly infectious secretion; they appear early, run a chronic course, and are most frequently encountered about the anus. With proper treatment they disappear, leaving copper-colored pigmentations, which finally fade.

The Vesicular Syphilide.—This syphilide is rare and occurs as an early manifestation. It appears in groups, situated upon the chin, about the mouth, upon the forearms, the nates, the hypogastrium, and the thighs, and is usually associated with a bullous or pustular eruption.

The vesicles may be large or small, are situated upon an infiltrated base of a brownish-red color, and contain serum or seropurulent fluid.

The Pustular Syphilide.—This syphilide generally appears before the eighth week; it may involve the entire body, but is usually most marked upon the thighs, the buttocks, and the face.

The pustules vary in size and are situated on a thickened, deep red base; they sometimes rupture, leaving an ulcerated surface, which may or may not become incrusted.

Those about the mouth have a tendency to coalesce. Groups of pustules are liable to form in the palms or soles, or develop around the nails, and finally destroy them. If the scalp is invaded there is usually some resulting alopecia.

The Furuncular Syphilide.—Furuncles are liable to appear as early as the sixth month, or as late as the third year, and may occur either alone or associated with other lesions.

They form slowly and without any signs of inflammation, the base being of a coppery-red color. Superficial ulceration occurs on the apex, leaving a deep ulcer, with everted margins, and a scanty, offensive secretion.

The bullous syphilide, or pemphigus, always indicates a severe and often fatal form of hereditary syphilis; it may occur at birth, or from a month to six weeks afterward.

The palms and soles are most frequently invaded, although any portion of the body may be attacked.

The bullæ are conical, rounded, or flattened, and contain seropurulent fluid, which soon becomes purulent; the surrounding skin is thickened and of a copper color. After rupturing, their course, when untreated, is chronic like that of the pustules.

The Tubercular Syphilide.—This eruption may occur as early as the sixth month, or even several years after birth.

It begins as deep-seated nodules or papules; these implicate the integument, forming sharply circumscribed tumors, which either disappear or break down into ulcers. The surface of the tubercles may be scaly, looking somewhat like psoriasis. They are usually found where the connective tissue is loose and abundant.

Gummata and Gummatous Ulcers.—These manifestations of the disease usually occur between the third and the twentieth years. Their course is similar to those in the acquired form.

THE MUCOUS MEMBRANES.

One of the first symptoms of hereditary syphilis is *snuffing*, accompanied by a profuse or scanty serous discharge

from the nostrils, which is due to a structural change in the nasal mucous membrane.

The secretion becomes purulent, bloody, offensive, and highly infectious, causing edema and excoriation of the nose and the upper lip, upon which crusts may form.

The lesion begins as a simple erythema of the mucous membrane, ulceration ensues, and the disease may then extend to the bony and cartilaginous framework of the nose, causing its destruction, with more or less resulting deformity (saddle-nose).

Mucous Patches.—These lesions are at first whitish in color, elevated, and surrounded by an erythematous border; the epithelium is soon removed, leaving a slightly depressed, red, and ulcerated surface.

Mucous patches are most commonly situated at the angle of the mouth, upon the mucous membrane of the cheeks, the fauces, the tonsils, the sides and dorsum of the tongue, and on the gums, near the teeth.

The secretion from the patches is free, serous in character, and highly contagious, so that great care must be exercised to guard against the infection of others, especially healthy wet-nurses, who would naturally be infected on the nipple or breast by nursing such children.

It has been observed that a child suffering from hereditary syphilis, whose mother is apparently healthy, may nurse at the mother's breast without infecting her. (Colles's law.) This has been taken as proving that the mother has become immune to the disease, though never infected. Present-day experience with the Wassermann reaction, however, suggests more and more strongly that such mothers are, in reality, syphilitic, but that, in them, the disease is in a condition of latency.

Gummatous Infiltrations.—The lesions generally occur between the third and the twelfth years.

They consist of a cellular infiltration of the mucous membrane, which at first becomes reddened and elevated, and finally develops into well-marked tumors, which usually break down into undermined ulcers, with a greenish, thick secretion.

Their favorite sites are the hard palate and the posterior pharyngeal wall.

THE RESPIRATORY ORGANS.

During the early years of syphilis the larynx may be the seat of simple hyperemia, of mucous patches, or of ulceration, which involves either the mucous membrane alone or the cartilage beneath it.

Gummatous infiltrations of the larynx belong to the later stages of the disease.

Upon the surface of the lung, and scattered through its substance on the smaller vessels and bronchi, numerous nodules, differing in size, and varying in color from a grayish pink to a light yellow may occur; the pleura near these nodules becomes opaque and thickened.

An entire lung, or only portions of a lobe, may be involved.

The morbid process begins by congestion, followed by cell-proliferation around the bronchioles and in the walls of the capillaries, causing partial or complete occlusion of their lumen, and destruction of the function of the lung. The nodules consist of connective-tissue cells, of fibrinous and of gummatous tissue, and may undergo fatty or caseous degeneration. True gummatous nodules do sometimes occur.

These lesions are most frequently encountered within the first eighteen months of life.

THE ALIMENTARY CANAL.

It is thought by some observers that the chronic diarrhea met with in syphilitic children is due to an erythema of the gastro-intestinal mucous membrane, similar to the erythema occurring in the mouth and pharynx.

The liver may be the seat of a connective-tissue infiltration, which renders it hard, lobular, and hypertrophied; these changes are either circumscribed or general.

This new indurated tissue causes the capillaries to become obliterated, and the caliber of the larger vessels to be diminished, and also compression of the cells of the acini, with cessation of the flow of bile.

Gummatous hepatitis occurs either as numerous small tumors, scattered through the substance of the liver, or as one or more isolated larger masses.

During the early stages of the disease **the spleen** may become more or less hypertrophied, but this enlargement yields readily to constitutional treatment.

The enlargement is very great, rapid in its course, and most marked in cachectic children, and those in whom the disease is of a severe type.

The pancreas may become enlarged and firm in consistence. The interstitial connective tissue is increased, especially between the larger lobules, causing compression of them, with atrophy, and fatty degeneration of their epithelium.

THE GENITO-URINARY ORGANS.

In the kidneys the lesion consists of a diffuse or circumscribed infiltration of small round or fusiform-shaped cells into the connective-tissue framework, followed by compression or destruction of the tubules and colloid degeneration of their epithelium; the organs are at first enlarged, but gradually become greatly reduced in size.

The suprarenal capsules sometimes become enlarged, owing to the proliferation of young connective-tissue cells.

When the testicles are affected the disease consists of a chronic, painless enlargement of one or both organs, generally accompanied by hydrocele and hyperemia of the scrotum. The epididymis and cord are sometimes involved.

The lesion consists of a connective-tissue proliferation, either interstitial or diffuse.

If commenced at an early date, constitutional treatment causes speedy resolution; but if neglected, atrophy or degeneration with abscess-formation, followed by fungous protrusion of the testicle, may occur.

In all probability the ovaries are affected in a similar manner.

THE NAILS.

Affections of the nails are not so common in hereditary as in acquired syphilis.

There are two forms of onychia: the ulcerative and the non-ulcerative.

Ulcerative onychia usually occurs during the first and second years of the disease, but may appear much later. It is the most common form, and begins at the side or base of the nail as a papule or pustule, which ulcerates and

extends along the base or margins of the nail, and finally involves the matrix, which results in the loss of the nail, thus leaving an unhealthy-looking ulcer, with sanious discharge. The terminal phalanx becomes red, enlarged, and painful.

The nails of the fingers are more liable to be attacked than those of the toes.

Cicatrization of the ulcer, without the formation of a new nail, sometimes follows, or a deformed and useless one may grow.

Non-ulcerative onychia is a later and more chronic manifestation.

It commences as a coppery-colored swelling at the margin or base of the nail, which soon becomes thickened, fissured, and brittle, dirty white in color, with hyperemia of the matrix and adjoining tissues. There is usually some deformity of the phalanx, which may or may not be permanent.

THE TEETH.

The permanent teeth in hereditary syphilis may present certain peculiarities, especially the upper central incisors of the second set, which are known as Hutchinson's teeth. (Fig. 133).

In describing these teeth Hutchinson says: "As diagnostic of hereditary syphilis, various peculiarities are often presented by the other teeth, especially the canines, but the upper central incisors are the test teeth. When first cut these teeth are usually short, narrow from side to side at their edges, and very thin. After a while a crescentic portion from their edges breaks away, leaving a broad, shallow, vertical notch, which is permanent for some years, but

between twenty and thirty usually becomes obliterated by the premature wearing down of the tooth. The two teeth often converge and sometimes they stand widely apart. In certain instances in which the notching is either wholly absent or but slightly marked, there is still a peculiar color and a narrow squareness of form, which are easily recognized by the practised eye."

The first or temporary set of teeth do not show this malformation, and many children suffering from hereditary syphilis have perfectly normal permanent teeth.

FIG. 133.—Hutchinson's teeth.

THE HAIR.

Affections of the hair in hereditary syphilis are very like those in the acquired form. They occur with lesions of the scalp, especially the pustular syphilide.

THE BONES.

Osteochondritis.—This affection occurs either in the first months of the disease or as late as the twelfth year, and is a very constant manifestation of untreated hereditary syphilis.

It most commonly attacks the bones of the forearm, the leg, the arm, and the thigh, but the clavicle, the sternum, the ribs, the metacarpal and the metatarsal bones may also be involved.

The lesion is situated at the diaphyso-epiphyseal junction, and consists of a ring-shaped swelling around the end of the bone. In some cases the entire epiphysis may be enlarged, with or without the ring-formation at its junction with the shaft. If two bones are affected, as those of the forearm or the leg, they appear to be fused together by this process. The distal ends of the bones are more frequently attacked than the proximal.

The lesion develops slowly in some cases, and rapidly in others; causes but little pain, interferes only slightly with motion, and disappears under proper treatment. The integument is not involved unless the mass be very large, when it is rendered tense and painful. The joints may be secondarily invaded, especially the elbow- and knee-joint.

In some cases the lesions degenerate and break down, causing ulcerations of the integument; the epiphysis may be separated from the shaft and destroyed, likewise the cartilage. In other cases resolution of the swellings occurs, and the bone returns to its normal condition; but if the intermediate layer of cartilage be destroyed, the bone is usually shortened.

Periostitis is a later affection, and usually appears between the fourth and nineteenth years.

Any of the long bones may be affected, and in some cases those of the skull also. The bone becomes tender, enlarged, and curved anteriorly; the process may involve the entire length of the shaft, or be localized and produce nodes. One or both limbs can be thus affected.

Dactylitis.—The lesions consist of swelling of the phalanges, and of the metacarpal or metatarsal bones in the early months of the disease, or even as late as the twentieth year.

The proximal phalanges are more often attacked than the distal ones. The course of this affection is chronic, unless treated.

THE SHEATHS OF THE TENDONS.

The sheaths of the tendons may become swollen and filled with fluid, the overlying skin being distended and reddened. This affection comes on rapidly, is not readily influenced by antisyphilitic treatment, and runs a chronic course.

THE JOINTS.

In some cases of osteochondritis there is a serous effusion into the neighboring joint, which becomes slightly painful on account of the tension; resorption and complete recovery usually ensue. The elbow, the wrist, the shoulder, the knee, and the ankle are most frequently involved, although almost any articulation is liable to invasion.

In the latter years of syphilis the larger joints may be affected either primarily or secondarily to lesions of the bones. The process is slow, the joint being greatly distended and slightly painful; the surrounding skin remains normal. With the proper treatment resolution generally takes place, leaving a good articulation.

THE EYES.

In hereditary syphilis the eyelids and the eye itself are liable to all of the lesions which occur in the acquired form,

and which have already been described under that heading. These affections may appear at a very early date.

THE EARS.

The occurrence of sudden deafness in children who have hereditary syphilis is quite common. It is apparently due to disease of the nerves, or of their distributions in the labyrinth. The changes in the external parts, or the membrana tympani, are not sufficient to account for the deafness; the Eustachian tubes also remain normal.

Deafness, when it occurs, is usually observed from about the tenth to the twentieth year. The prognosis is, as a rule, unfavorable.

THE NERVOUS SYSTEM.

In hereditary syphilis inflammation of the meninges and endarteritis have been observed; also gummata upon the membranes.

Chorea sometimes occurs, and is either mild or severe in character; it may be accompanied by hemiplegia or epilepsy. In these cases it is thought that hemiplegia is caused by obstruction of the middle cerebral artery; that chorea is due to occlusion of its small distal branches, and that epilepsy is occasioned by thickening of the meninges or by gummata in or near the corpus striatum.

Epilepsy may occur alone, and has been observed as late as the fifteenth year.

There is sometimes paralysis of the cranial nerves.

HEMORRHAGIC SYPHILIS IN NEWBORN CHILDREN.

This condition exists at birth, or not later than the first month of life, and is frequently the only manifestation of the disease, but it may be accompanied by other lesions.

In some cases there is a small, subcutaneous hemorrhage in parts exposed to friction or pressure, while in other cases it occurs in or upon mucous membranes and viscera, or from the umbilical vein, and may be profuse or even fatal.

TREATMENT OF HEREDITARY SYPHILIS.

If a pregnant woman is syphilitic, she should immediately be given the constitutional treatment outlined in the chapters on Acquired Syphilis, and this should be continued in a careful and methodical manner during her pregnancy, and thereafter until she is pronounced free from the disease.

The mother's genitals must be kept in a healthy, clean condition, and, if lesions exist upon or around them, should receive active and appropriate local treatment, by means of hot bichloride douches, calomel dusting powders, and, in some cases, applications of mercurial ointment, if indicated.

When these measures are taken early enough in the pregnancy, infection of the fetus may usually be avoided. After the fifth or sixth month, however, the child is very liable to contract the disease, and even if apparently perfectly healthy at birth, should be considered as possibly syphilitic and kept under careful observation, with repeated blood examinations, and a vigilant watch for the development of lesions.

If the father was syphilitic at the time of impregnation or showed any manifestation of syphilis before it, then the

mother must have antisyphilitic treatment in the manner above described for its beneficial effect both on the fetus and herself.

In treating syphilitic infants great care must be used, as the use of inunctions is sometimes difficult on account of the delicacy and irritability of the skin, and the development of gastro-intestinal irritation.

Treatment of the child by means of the milk of the mother or nurse is known as *indirect treatment*. Although some of the drug may be eliminated through the milk of the nursing woman, it is at best an uncertain and inaccurate method of treatment, and one not to be relied upon. It must not be forgotten that a healthy wet-nurse is very liable to infection on the breast or nipple by nursing such children.

The *direct treatment* of the child should be intermittent and not continuous in character; during the intervals of treatment it is well to administer tonics, and to do all in our power to build up the general condition.

As in the case of adults the treatment should include the compound use of salvarsan or neosalvarsan, mercury and iodide of potash. The dosage of salvarsan in the case of an infant should run from 0.01 to 0.02 gm.; that of neosalvarsan may be slightly higher, and these should be cautiously repeated at intervals according to the condition and susceptibility of the child.

For inunctions we employ 50 per cent. mercurial ointment, using from 10 to 20 grains every day, or every other day, according to the age and condition of the child.

The administration of mercury by intramuscular injection is too painful a method to be employed for children.

Potassium iodide is best administered in the child's bottle of milk. The dosage for an infant is from 0.5 to 1 gr., or

even more, three times a day. In breast-fed infants it may be given dissolved in water, with a little sugar of milk.

The internal administration of mercury may occasionally have to be resorted to, but, as in adults, this method is neither satisfactory nor advisable, and should only be used when no other is possible.

If the syphilides are very persistent, much benefit is always derived from their local treatment by fumigations, ointments, lotions, or baths containing mercury; at the same time keeping the lesions scrupulously clean.

Constitutional treatment should always be employed for at least two years, and continued for several months after all manifestations of the disease have disappeared; the Wassermann reaction being taken at intervals for several years thereafter.

INDEX.

A

Abscess, complicating stricture of urethra, 131
periurethral, 56
of prostate, 64
rupture of, 64
situation, 64
symptoms of, 64
treatment of, 67, 68
Adenitis complicating urethritis, 61
Albargin, 45
Alimentary canal, syphilis of, 344
Allis's clamp, 172
Alopecia, 263
prognosis of, 263
symptoms of, 263
varieties of, 263
Anus, syphilitic lesions of, 274
Argyrol, 45
Arnott's grooved director, 167
Arthralgia, 304
Arthritis, gonorrheal, 107. *See* Gonorrheal arthritis.
Aspiration of bladder, 180

B

Balanitis, 51
diagnosed from acute gonorrhea, 30
treatment of, 51
Balanoposthitis, 51
diagnosed from acute gonorrhea, 30
infected, 231
Bladder, aspiration of, 180
diverticula of, complicating stricture of urethra, 131
Bloodvessels, syphilis of, 283
Bones, syphilis of, 301, 347
Bougies, 140, 144, 153
à boule, 141
method of passing, 144, 149
care of, 189, 190
filiform, 141, 152, 153, 165
care of, 190
method of passing, 149
olivary, 140, 152, 153
Bronchi, syphilis of, 280

C

Catheter carriers, 193
fever, 185. *See* Urinary fever.
Catheterization, retrograde, 174
Catheters, 182
bicoudé, 181, 182
blunt, 178
bulbous, 46
care of, 191
coudé, 181, 182
instillation, 96
olivary, 178, 182
silver, 183, 191
with prostatic curve, 183
soft-rubber, 46, 87, 191, 192
tunnelled, 180, 191
ureteral, 194
woven, 191
Chancre, 228. *See* Syphilis, initial lesion.
diagnosed from chancroid, 235
differential diagnosis of, 235
extragenital, 229
genital, 229
hard, 228
Hunterian, 228

Chancre of meatus or urethra, diagnosed from acute gonorrhea, 30
soft, 208. *See* Chancroid.
synonyms of, 228
Chancroid, 208
characteristics of, 209
complications of, 211
adenitis, 212
lymphangitis, 211
differential diagnosis of, 212, 235
abrasions, 213
chafes, 213
exulcerated balanitis, 212
fissures, 213
gonorrhea, 31
hard chancre, 212, 235
herpetic vesicles, 212
duration of, 210
etiology of, 208
bacillus of Ducrey, 209
infection of, 208
direct, 208
mediate, 208
prognosis of, 213
seat of, 210
treatment of, 213
of adenitis, 217
first method, 217
second method, 218
general, 213
of the sore, 214
beneath prepuce, 215
of urethra, 214
varieties of, 210
echthymatous, 211
follicular or acneform, 210
phagedenic, 211
Chordee, 26
to relieve, 43
Circulatory organs, syphilis of, 282
Circumcision, 205
Clamp, Hayden's, 206
Colles's law, 342
Condylomata, 240, 268, 340
Congenital syphilis, 336. *See* Hereditary syphilis.
Cowperitis, 59
suppurative, 60
treatment of, 60
Credé's method of treating gonorrheal ophthalmia, 105
Cystitis, 80
gonorrheal, 80
symptoms of, 81
acute, 81
chronic, 81
subacute, 81
urine, 81
treatment of, 81
acute stage, 81
chronic stage, 82
irrigations, 82

D

Dactylitis, 298, 349
varieties of, 298
Digestive organs, syphilis of, 269
Dilatation of ureters complicating stricture of urethra, 132
of urethra, 152–156
continuous, 154
gradual, 153
complications of, 154
instruments, 153
medication, 154
rapid, 154
Diverticula of bladder complicating stricture of urethra, 131
Divulsion, 156
Dressings in acute gonorrhea, 37, 39, 40, 41, 42

E

Ears, syphilis of, 314, 349
Electrolysis, 156
Endoscope, 97–101
care of, 189
Endoscopy, 97
indications for, 97
method of, 101
Epididymitis, 71, 284
lesions of, 284
symptoms of, 72
treatment of, 73
Epididymo-orchitis, 71
dressing for, 74
symptoms of, 72
treatment of, 73
Episcleritis, 309

Erections, painful, 26
to relieve, 43
Erythema, 238, 267, 269, 273, 278
Esophagus, syphilitic lesions of, 274
Extravasation of urine, 132
causes of, 132
regions of, 132
symptoms of, 133
constitutional, 133
local, 133
treatment of, 136
Eye, syphilis of, 306, 349

F

Fever, catheter, 185. *See* Urinary fever.
syphilitic, 236
urethral, 185. *See* Urinary fever.
urinary, 185. *See* Urinary fever.
Filiforms, care of, 190
to pass, 149
to tie in, 179
Fistulæ, complicating stricture of urethra, 131
Folliculitis, 57
paraurethral, 58
penile, 57
preputial, 57, 58
treatment, 58, 59
Fluhrer's urethrotome, 159, 160

G

Genito-urinary organs, syphilis of, 284, 345
Glans penis, affections of, 198
Gleet, 84. *See* Gonorrhea, chronic.
Glycerin as a lubricant, 195
Gonococcus, 19, 20
progress of, 22
staining of, 20, 21
Gonorrhea, 17
acute, 24
anterior, 24
complications of, 51–62
stages of, 25
acute, 25
declining, 26
Gonorrhea, acute, anterior, stages of, prodromal, 25
symptoms of, 25
incubation, 24
opacity of urine, 30
two-glass test, 28
treatment of, 32, 37
abortive, 32
of declining stage, 43
dressings, 37, 39, 40, 41, 42
hand-injections, 43
internal medication, 43
irrigations, 43
Janet's method, 35
anteroposterior, 24
diagnosis of, 30
posterior, 27
complications of, 63–83
prognosis of, 31
treatment of, 48
two-glass test, 28
retention of urine during, 177
chronic, 84
anterior, 84, 86
symptoms of, 86
treatment of, 90
irrigations, 90
sounds, 92
anteroposterior, 84
causes, 84
lesions, 84
posterior, 87
symptoms of, 88
treatment of, 92
instillations, 95
irrigations, 93
amount of fluid, 94
solutions, 94
treatment of, 89
varieties of, according to location, 84
anterior, 84
anteroposterior, 84
posterior, 84
urethrocystitis, 84
complications of, 25
course of, 24
definition of, 17
diagnosis of, 30
differential, 30
balanitis, 30

Gonorrhea, diagnosis of, differential chancre, 30
chancroid, 31
etiology of, 19
diplococcus, 21
gonococcus, 19, 20. *See* Gonococcus.
other microörganisms, 19
localities, 17
occurrence, 17
pathology, 22
prognosis, 31
smear, method of obtaining, 20
of staining, 21
when cured, 101
Gonorrheal arthritis, 107
bacteriology of, 107
cause of, 107
diagnosis of, 111
frequency of, 108
joint lesions of, 109
muscles, 111
pathology of, 108
symptoms of, 109
treatment of, 112
vaccines in, 113
flakes or shreds, 86
anterior urethra, 87
posterior urethra, 87
ophthalmia, 104
cause of, 104
prognosis of, 105
symptoms of, 104
treatment of, 105
rheumatism, 107. *See* Gonorrheal arthritis.
Gouley's bistoury, 159
tunnelled catheter and guide, 180
sound and filiform, 155
Gummata, 255, 257, 341. *See* Syphilide, gummatous.
of soft palate, 273
of tongue, 271
Gummatous ulcers, 258, 341

H

Hairs, syphilis affecting, 263, 347
Hand-injections, 43
Hanover urethral syringe, 44
Hayden's bladder syringe and coupler, 33
bridge for inflamed testicle, 73
circumcision clamp, 206
double-current irrigation tubes, 65
dressing for epididymo-orchitis, 74
instillation syringe, 34
sound, 139
staff and filiform, 165
three-way stopcock, 329
trocar and cannula, 181
urethral forceps, 193
urethroscope, 99
Hemorrhagic syphilis in newborn children, 351
Hereditary syphilis, 223, 336
abortion, 338
appearance of symptoms, 336
Colles's law in, 342
course of, 337
definition of, 336
derivation of, 336
duration of, 337
hemorrhagic, in newborn children, 351
lesions of, 339
alimentary canal, 344
bones, 347
condylomata, 340
dactylitis, 349
ears, 350
eyes, 349
genito-urinary organs, 345
gummata, 341
gummatous infiltrations, 343
ulcers, 341
hairs, 347
joints, 349
kidneys, 345
larynx, 343
liver, 344
lungs, 343
mucous membranes, 341
nasal, 341
patches, 342
nails, 345
nervous system, 350
chorea, 350
epilepsy, 350

Hereditary syphilis, lesions of, nervous system, hemiplegia, 350
meninges, 350
paralysis of cranial nerves, 350
osteochondritis, 347, 349
pancreas, 344
periostitis, 348
respiratory organs, 343
spleen, 344
syphilides, 339–341
bullous, 341
erythematous, 339
furuncular, 340
papular, 339
pustular, 340
tubercular, 341
vesicular, 340
teeth, 346
tendon sheaths, 349
testicles, 345
mortality, 338
prognosis of, 338
snuffling, 341
transmission of, 337
treatment of, 351
direct, 352
fumigations, 353
intramuscular injections, 352
mixed treatment, 352
neosalvarsan, 352
salvarsan, 352
duration, 353
father syphilitic, 351
indirect, 352
pregnant woman, 351
Herpes progenitalis, 198
cause of, 198
diagnosis of, 199
lesion of, 198
prognosis of, 199
symptoms of, 199
treatment of, 200
Hutchinson's teeth, 346, 347

I

Instillation catheter, 96
Instillations, 95
Instrumentation, 195
Instruments, 188. *See* Urethral instruments.
Intestines, syphilitic lesions of, 274
Iritis, 309
acute, 310
chronic, 311
parenchymatous or suppurative, 310
serous, 310
simple or plastic, 310
Irrigation, 33, 43, 46, 82, 90, 93
solutions, 91

J

Janet's method of treating acute gonorrhea, 35
Joints, syphilis affecting, 301, 304, 349

K

Kollman's dilators, 155
Keratitis, 308
diffuse, 308
punctate, 309
Kidneys, syphilis affecting, 345

L

Larynx, syphilis affecting, 278, 343
Litholapaxy tubes, care of, 191
Lithotrites, care of, 190
Liver, syphilis affecting, 275, 344
Lubricants, 194
glycerin, 195
lubrichondrin, 195
olive oil, 195
white vaseline, 195
Lubrichondrin as a lubricant, 195
Lungs, syphilis affecting, 280, 343
Luy's urethroscope, 98
Lymphangitis complicating urethritis, 61

M

Macular syphilide, 238
Maisonneuve's urethrotome, 158, 159

Meatotomy, 157
Meatus sound, 157
Mixed sore, 213
Mouth, syphilis of, 269
Mucous papules, 267. *See* Mucous patches.
patches, 267, 342
complications of, 268
of larynx, 279
lesions of, 268
of tongue, 269
within the mouth, 268
Myositis, 296

N

Nails, syphilitic lesions of, 263, 345
Neosalvarsan, 326, 352
Nervous system, syphilis affecting, 288, 350
Nose, syphilis affecting, 278

O

Olive oil as a lubricant, 195
Onychia, 264, 345
non-ulcerative, 346
separation of the nail, 264
sicca, 264
ulcerative, 345
Opacity of urine, 30
Ophthalmia, gonorrheal, 104. *See* Gonorrheal ophthalmia.
neonatorum, 104. *See* Gonorrheal ophthalmia.
Orchitis, 284
circumscribed, 285
course of, 285
differential diagnosis of, 286
diffuse of, 285
site of, 284
symptoms of, 285
Osteochondritis, 347, 349
Otis's perineal drainage tube, 169
urethrometer, 141
urethrotome, 160

P

Palate, gummata of, 273
Pancreas, syphilis affecting, 277, 344
Paraphimosis, 53
treatment of, 54, 55
Paraurethral folliculitis, 58
Perineal section, 173
Perionychia, 265
non-ulcerative, 265
ulcerative, 265.
Periostitis, 348
Periurethral abscess, 56
treatment of, 57
Pharynx, syphilitic lesions of, 273
Phimosis, 52
acquired, 52
congenital, 52, 205
scissors, 215
Prepuce, affections of, 198
Preputial folliculitis, 58
Prostate, abscess of, 64
treatment of, 67, 68
congestion, 63, 68
inflammation, 63, 68. *See* Prostatitis.
Prostatitis, acute, 63
symptoms of, 63
treatment of, 64
chronic, 68
diagnosis of, 69
symptoms of, 69
treatment of, 70
Protargol, 45
Pus in urine, 29
Pyelitis, 83
Pyelonephritis, 83
Pyuria, 29

R

Radish finger, 111
Rectal electrode, 71
Respiratory organs, syphilis affecting, 278, 343
Retention of urine, 176
causation, 176
effects on mucous membrane, 177
treatment of, 177

Retention of urine, treatment of, aspiration, 180
during acute gonorrhea, 177
when caused by stricture, 178
when due to prostatic hypertrophy, 183
Retrograde catheterization, 174
Rheumatism, gonorrheal, 107. *See* Gonorrheal arthritis.
Rupia, 252
cicatrices, 253
lesion, 252
varieties, 252

S

Salivation, 325
symptoms of, 325
treatment of, 326
Salvarsan, administration of, 326, 352
gravity apparatus, 328
Scale plate, 138
Schreiber's needle, 329
Seminal vesiculitis, 76
acute, 76
chronic, 77
Serum in treatment of gonorrheal arthritis, 114
Silk bulbous instillation catheter, 96
Smear, to take, 20
Smoker's patches or plaques, 269
Snuffling, 341
Soft palate, gummata of, 273
Sounds, 92, 140, 189
care of, 189
meatus, 157
method of passing, 144
Spermatocystitis, 76. *See* Seminal vesiculitis.
Spirocheta pallida, 221, 222
refringens, 222
Spleen, syphilis affecting, 276, 344
Stricture of the urethra, 115
complications of, 130, 154
abscesses, 131
diverticula of bladder, 131
extravasation of urine, 132. *See* Extravasation of urine.
Stricture of the urethra, complications of, fistulæ, 131
ureters, dilatation of, 132
diagnosis of, 138
instruments, 138
method of passing a sound, 144
preliminary examination, 142
urethral exploration, 143
etiology of, 118
forms of, 125
annular, 125
congenital, 118, 119
irregular, 125
linear, 125
semifibrous, 121
soft, 121
spasmodic, 126
tortuous, 125
traumatic, 118
gonorrheal, 118, 120
number, 120
pathology of, 121
seat of, 119
region, 119
symptoms of, 127
time of occurrence of, 121
treatment of, 151
beyond penoscrotal junction, 152
congenital, 151
dilatation, 152, 153
continuous, 154
gradual, 153
rapid, 154
divulsion, 156
electrolysis, 156
meatotomy, 157
near the meatus, 152
penile urethra, 152
perineal section, 173
retrograde catheterization, 174
traumatic, 151
urethrectomy, 157
urethrotomy, 158, 163. *See* Urethrotomy.
Suspensory bandages, 8
Synovitis, 305
Syphilides, 237, 339
bullous, 253, 341
course, 238

Syphilides, erythematous, 238, 339. *See* Erythema.
lesion, 239
site, 239
synonyms, 238
gummatous, 255
precocious, 255
varieties of, 255
tertiary, 255
macular, 238
maculopapular, 243
malignant precocious, 261
definition of, 261
occurrence of, 261
symptoms of, 261
varieties of, 261
papular, 241, 339
conical or miliary, 241
lenticular or flat, 242
lesion, 241
scaling of palms and soles, 245
course, 245
varieties, 241
pigmentary, 260
forms of, 260
pustular, 248, 340
acneform, 248
ecthymaform, 251
impetigoform, 249
variolaform, 250
rupia, 252. *See* Rupia.
serpiginous, 250, 259
deep, 260
superficial, 259
tubercular, 253, 341
forms, 253
Syphilis, 221
acquired, 223
adenitis, 234. *See* Syphilitic adenitis.
arthralgia, 304
of bloodvessels, 283
of bones, cartilages, and joints, 301
of bronchi, 280
of circulatory organs, 282
congenital, 336. *See* Hereditary syphilis.
constitutional treatment of, 316–335
baths, 317
diet and daily habits, 316
Syphilis, constitutional, treatment of, duration, 334
iodide of potash, 323
iodism, 324
mercury, 318
complications of, 318
fumigation, 321
intramuscular injections, 322
inunction, 319
regions, 320
by mouth, 318
mixed treatment, 324
neosalvarsan, 318, 326, 352
intramuscularly, 327
intravenously, 327
primary stage, 317
anemia, 317
salivation, 325. *See* Salivation.
salvarsan, 318, 326, 332, 352
Wassermann reaction, 335
Zittmann's decoction, 325
contagion, 224
cutaneous manifestations, 237. *See* Syphilides.
of digestive organs, 269
of ear, 314
external auditory canal, 314
internal ear, 315
middle ear, 314
of esophagus, 274
etiology of, 221
Spirocheta pallida, 221
of eye, 306
choroid, 312
ciliary body, 311
conjunctiva, 307, 308
cornea, 308. *See* Keratitis.
eyelids, 307
iris, 309. *See* Iritis.
lacrimal glands, 307
passages, 306
muscles, 308
nerves, 313
optic nerve, 313
orbit, 306
retina, 312
sclerotic coat, 309
of fingers and toes, 298. *See* Dactylitis.
of genito-urinary organs, 284

Syphilis of genito-urinary organs, epididymis, 284. *See* Epididymitis.
kidneys, 287
penis, 286
testicles, 284. *See* Orchitis.
uterus and adnexa, 286
of hair, 263. *See* Alopecia.
of heart, 282
hemorrhagic, in newborn children, 351
hereditary, 223, 336. *See* Hereditary syphilis.
incubation period, 223
infantile, 336. *See* Hereditary syphilis.
infection, 225
direct, 225
mediate, 225
initial lesion, 228
duration of, 232
induration of, 231
parchment, 232
relapsing, 232
origin of, 228
seat of, 229
secretion of, 232
termination of, 231
treatment of, 233
local, 233
varieties of, 231
insontium, 225
of joints, 304
arthralgia, 304
synovitis, 305
of larynx, 278
chronic inflammations, 279
deep ulcerations, 279
erythema, 278
mucous patches, 279
superficial ulcerations, 279
tertiary lesions, 279
vegetations, 279
late osseous lesions, 302
osteomyelitis, 304
osteoperiostitis, 302
of liver, 275
of lungs, 280
lymphangitis, 235. *See* Syphilitic lymphangitis.
of maxillary bones, 304
of mouth, 269
Syphilis of mouth, erythema, 269
mucous patches, 269
papules, 269
vesicles, 269
of mucous membranes, 267
condylomata, 268. *See* Condylomata.
erythema, 267. *See* Erythema.
mucous patches, 267. *See* Mucous patches.
of muscles, 296
of nails, 263. *See* Onychia and Perionychia.
of nervous system, 288
aphasia, 292
arachnoid and pia mater, 289
arteries, 289
brain and cord, 289
dura mater, 288
epilepsy, 291
general paralysis, 294
hemiplegia, 290
locomotor ataxia, 293
nerves, 290
paraplegia, 292
of skull and vertebræ, 288
syphilitic tumors, 290
of nose, 278
of pancreas, 277
of pharynx, 273
of pleura, 281
precocious osseous affections, 301
prognosis of, 226
of rectum, 274
stricture, 275
reinfection, 223
of respiratory organs, 278
secondary period, 236
anemia, 237
commencement, 236
icterus, 237
insomnia, 237
neuralgic pains, 236
sensory disturbances, 237
syphilides, 237. *See* Syphilides.
syphilitic fever, 236
of soft palate, 273
of spleen, 276
Spirocheta pallida, 221
stages of, 223
primary, 223

Syphilis, stages of, secondary, 224
tertiary, 224
of stomach and intestines, 274
synovitis, 305
of tendons, sheaths, aponeuroses, and bursæ, 297
of tongue, 269
differential diagnosis of, 271
carcinoma, 272
gummata, 271
initial lesion, 271
tubercular ulcers, 272
erythema, 269
fissures, 270
gummata, 271
mucous patches, 269
sclerosis, 270
deep, 270
superficial, 270
of trachea, 280
Syphilitic adenitis, 234
situation in relation to chancre 235
symptoms, 234
erythema, 238
fever, 236
lymphangitis, 235
symptoms of, 235
roseola, 238
Syringe for bladder, 33
instillation, 34
urethral, 44

T

Taylor's phimosis scissors, 215
Teale's gorget, 167
Teeth, Hutchinson's, 346
syphilitic lesions of, 346
Thompson's two-glass test, 28
Tongue, syphilis of, 269, 271

U

Ulcers, gummatous, 258
Ureteral catheters, care of, 194
Ureteritis, 83
Ureters, dilatation of complicating stricture of urethra, 132
Urethra, anatomy, 115
Urethra, caliber, 118
divisions, 119
length, 117
portions, 116
bulbous, 116
fixed, 116
membranous, 116
narrow, 117
penile or pendulous, 116
prostatic, 116
shape, 118
stricture of, 115. *See* Stricture of the urethra.
structure of, 115
Urethral and bladder irrigation, 47
fever, 185. *See* Urinary fever.
forceps, Hayden's, 193
instillation, 95
instruments, 188
care and use, 188
sterilization, 188
bougies à boule, 189
catheters, 191
silver, 191
soft-rubber, 191
tunnelled, 191
ureteral, 194
woven, 191
cystoscopes, 193
endoscopic tubes, 189
filiforms, 190
lithotrites, 190
olivary bougies, 189
sounds, 189
tunnelled, 189
syringes, 193
urethrotomes, 190
syringes, 44, 193
Urethrectomy, 157
Urethritis, catarrhal, 19
non-specific, 19
specific, 17. *See* Gonorrhea.
Urethrocystitis, 78
acute, 79
chronic, 79, 84
symptoms of, 79
treatment of, 80
Urethrometer, 141
method of use, 150
Urethroscope, 97
Hayden's, 99
Luy's, 98

Urethrotome, care of, 190
Fluhrer's, 159, 160
Maisonneuve's, 158, 159
Otis's, 160
Urethrotomy, 158–175
external, 163
bladder drainage, 163
indications, 163
method, 163
indications, 163
perineal section, 173
indications, 173
preparation of patient, 163
retrograde catheterization, 174
with a guide, 165
without a guide, 171
internal, 158
indications, 158
instruments, 158
urethrotomes, 158
Fluhrer's, 159
Maisonneuve's, 158
Otis's, 160
operation, 162
preparation of patient, 161
Urinary fever, 185
etiology of, 186
prophylaxis in, 186
treatment of, 186
varieties of, 185
Urine, extravasation of, 132. *See* Extravasation of urine.
retention of, 176. *See* Retention of urine.

V

Vaccines, in treatment of gonorrheal arthritis, 113
Vaseline as a lubricant, 195
Vegetations, 200
diagnosis of, 203
lesion, 201
treatment of, 204
Venereal warts, 201. *See* Vegetations.
Vesical tenesmus, 28
Vesiculitis, 76
abscess formation, 77
chronic, 77
diagnosis of, 78
symptoms of, 77
treatment of, 78
diagnosis of, 76
symptoms of, 76
treatment of, 77

W

Warts, 200. *See* Vegetations.
hard, 202
soft, 201
Wassermann's reaction, 233, 271, 276, 286, 295, 330, 335, 342, 353

Z

Zittmann's decoction, 325

RC201
Hayden
H32
1916
cop. 1

RC201
H32
1916
cop. 1